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ABSTRACT

This study evaluates the effect of treatment components through a secondary analysis of data from the National Treatment Improvement Evaluation Study (NTIES). The study examines the relationship between treatment components, client-level factors, and treatment outcomes, and how these relationships vary by treatment modality. It seeks to understand the response by NTIES clients to components of drug and alcohol treatment defined in ways that have external applicability and that are immediately available to care providers. Several dose components were shown to have significant effects on the odds of positive outcome. Several interactions between client-level factors and dose components were observed. Compared to the background variables alone, the inclusion of treatment components significantly improved the logistic regression models for non-methadone outpatient and short-term residential modalities both for outcomes and for methadone for treatment substance abstinence. Improvement for the long-term residential modality was marginal and not significant for the correctional modality. Implications for research, policy, and practice are discussed. Appendix A is "Description of the National Treatment Improvement Evaluation Study and Center for Substance Abuse Treatment Demonstrations (1990-1992)"; Appendix B is "Distributions of SDU Means for Treatment Components within Modalities"; and Appendix C is "Technical Notes." (Contains 10 figures, 8 tables, and 21 references.) (MKA)

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NATIONAL EVALUATION DATA SERVICES

TREATMENT COMPONENTS AND THEIR RELATIONSHIPS WITH DRUG AND ALCOHOL ABSTINENCE

January 2000

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NATIONAL EVALUATION DATA SERVICES

TREATMENT COMPONENTS AND THEIR RELATIONSHIPS WITH DRUG AND ALCOHOL ABSTINENCE

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FOREWORD

The Center for Substance Abuse Treatment (CSAT) works to improve the lives of those affected by alcohol and other substance abuse, and, through treatment, to reduce the ill effects of substance abuse on individuals, families, communities, and society at large. Thus, one important mission of CSAT is to expand the knowledge about and the availability of effective substance abuse treatment and recovery services. To aid in accomplishing that mission, CSAT continues to invest significant resources in the development and acquisition of high-quality data about substance abuse treatment services, clients, and outcomes.

In support of these efforts, the Program Evaluation Branch (PEB) of CSAT established the National Evaluation Data Services (NEDS) contract to provide a wide array of data management and scientific support services across various programmatic and evaluation activities and to mine existing data whose potential has not been fully explored. Essentially, NEDS is a pioneering in that the CSAT previously had no mechanism established to pull together databases for broad analytic purposes or to house databases produced under a wide arra of activities. One of the specific objectives of the NEDS project is to provide CSAT with a flexible analytic capability to use existing data to address policy-relevant questions about substance abuse treatment. This report has been produced in pursuit of that objective.

How drug and alcohol abuse treatment outcomes are affected by different amounts and components of treatment is fundamentally important to evaluating current treatment practices and improving treatment in the future. The present study operationalized and evaluated components of treatment through a secondary analysis of data from the National Treatment Improvement Evaluation Study (NTIES) (see Appendix A) and used multivariate analyses to model the effect of the components on two dichotomous outcome measures: abstinence at follow-up of a substance for which the client sought treatment and abstinence at follow-up of all substances, including alcohol. The study examined the relationships among treatment components, client-level factors, and treatment outcomes and how these relationships vary by treatment modality.

The results presented here suggest that greater intensity of treatment can improve outcomes in short-term residential settings and that treatment plans can be useful in man settings. They also suggest that longer lengths of stay may enhance treatment outcomes in non-

methadone outpatient and long-term residential modalities, even when patients do not complete treatment, and that research into related services such as aftercare and overutilization could be productive.

Sharon Bishop
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National Evaluation Data Services

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1. INTRODUCTION

How different amounts and components of treatment affect drug and alcohol abuse treatment outcomes is fundamentally important to evaluating current treatment practices and improving treatment in the future. Additionally, understanding the interaction between client severity, client characteristics, and treatment components can point to more effective treatment strategies. However, understanding relationships between treatment components and outcomes is complicated by a number of factors: 1) different populations respond to different treatment components, 2) it is difficult to tease out the effects of specific components in a comprehensive treatment environment without experimental designs that isolate those components, and correspondingly, 3) it is difficult to control for client self-selection into treatment services. Yet the relationship between treatment components and outcomes is something that the treatment field must understand better. The downstream implications for the treatment communities (e.g., practice guidelines), the behavioral health care industry (e.g., managed care organization coverage of substance abuse treatment), and of course the clients (more cost-effective treatments and increased quality of life) are enormous.

The present study evaluated the effect of treatment components through a secondar analysis of data from the National Treatment Improvement Evaluation Study (NTIES). The study examined the relationships between treatment components, client-level factors, and treatment components and how these relationships vary by treatment modality. It sought to understand the response by NTIES clients to components of drug and alcohol treatment defined in ways that have external applicability and that are immediately available to care providers.

2. METHODOLOGY

NTIES data for 3,085 clients across five treatment modalities were used in this study. The five modalities were methadone maintenance, non-methadone outpatient, short-term residential, long-term residential, and correctional. All analyses were conducted separately b modality so as not to obscure meaningful differences in effects of treatment components in different modalities.

Treatment components included in the analysis were: length of stay in treatment; hours spent in counseling sessions per month; general measures of drug and alcohol, medical, and mental health treatment; ancillary and supportive services; client-treatment matching (whether the SDU reported it matched most or all of its patients); prominence of treatment plans (whether

the patient said they saw "a treatment plan or a list of treatment goals"); average weekl methadone dose (methadone modality only); and certain other medications. A number of client-level factors were included as background variables to partially control for self-selection and permit assessment of interactions between client characteristics and treatment components.

A multilevel mixed-effects logistic regression model was used to estimate the effect of treatment components on two measures of abstinence: abstinent at follow-up from a substance for which the client sought treatment and abstinent from all substances. Estimates of the overall contribution of treatment components in explaining outcomes (over and above background variables) were also examined.

3. RESULTS

Several dose components were shown to have significant effects on the odds of a positive outcome:

- Length of stay showed a consistently positive effect on both treatment substance and all substance abstinence; however, the effects were statistically significant in the non-methadone outpatient and long-term residential modalities only. In these modalities, the odds ratios suggest that controlling for other variables and increasing length of stay by 30 days can improve the odds of a successful outcome by as much as 15 percent.

- Whether or not clients reported seeing their treatment plan also was consistentl positive across all modalities, though statistically significant in only the methadone and short-term residential modalities, where seeing treatment plans increased the odds of all substance abstinence by 200 and 138 percent, respectively.

- As a main effect, hours per month in group and individual counseling had a significant positive effect in the short-term residential modality only. Educational, vocational and other ancillary services, the use of antianxiety and drug and alcohol medications, and patient matching also had positive impacts on one or both forms of abstinence in short-term residential Service Delivery Units (SDUs), suggesting that greater treatment intensity may pay off in that modality.

- One difference between the two endpoints is the significance and strength of social and family services in non-methadone outpatient and correctional facilities modalities. This component is significant and positive in all-substance abstinence but not in treatment substance abstinence.

Several interactions between client-level factors and dose components were observed, including the following:

- Significant interactions were observed between hours in group or individual counseling with the percent of needed social/family services received and the percent of needed employment/educational services received. Generally, the interactions with these two indices tended to attenuate the effects of hours per month in group or individual counseling, in that the interaction terms are positive when the effect of hours per month is negative (methadone, long-term residential) and negative when hours per month the effect of hours per month is positive (short-term residential).

- While women were significantly more likely to be abstinent in most modalities, the positive effects of hours per month in counseling, substance and alcohol medications, percent of needed services received, and treatment plans appeared to differentiall benefit men. This suggests that providers may need to offer more tailored approaches to these services so that women benefit as well.

- Treatment completion interacts with length of stay (non-methadone outpatient) and AA/NA/CA attendance during treatment (non-methadone outpatient and short-term residential). In the case of meeting attendance in the non-methadone outpatient modality, the main effect was not significant while the interaction was positive, suggesting that in this modality attendance at meetings may be more beneficial among clients who complete treatment. This may reflect the fact that meeting attendance and treatment completion are both manifestations of a single, unmeasured factor such as motivation, which in turn may be most likely to affect outcomes in the relativel unstructured environment of outpatient treatment.

Compared to the background variables alone, the inclusion of treatment components significantl improved the logistic regression models for non-methadone outpatient and short-term residential modalities both for outcomes and for Methadone for treatment substance abstinence. Improvement for the long-term residential modality was marginal p=.054 for treatment substance abstinent and p=.095 for all substance abstinent) and not significant for the correctional modality. Using the background models as the base, adding the treatment components increased the estimated variance accounted for by 1-2 percent in correctional modalities and 3-8 percent in the other modalities.

The following limitations should be considered in interpreting these results:

- Components of dose in some instances are not always definitive. Some questionnaire items are ambiguous, and refining the components will require continued work.

- Inferences from non-experimental data are inherently vulnerable to selection bias. As described in the report, the hierarchical set approach in which variance common to

background factors and dose components is "credited" to background factors offers some measure of protection against the misinterpretation of selection bias as treatment effects, but only to the extent that the selection bias is captured by the background factors that were measured and included in the models.

- Perhaps the most significant limitation is the inability to place the SDU episode in the context of the client's treatment continuum and the corresponding implications for interpreting dose. For example, because questions about services received were usually restricted to the dates of NTIES entry and treatment completion, there was no way to obtain information about phases of treatment obtained just before entering NTIES, and information about phases of treatment *within* the NTIES episode was not consistently reported.

4. IMPLICATIONS FOR RESEARCH, POLICY, AND PRACTICE

The following is a list of research areas that could productively be investigated with NTIES data:

- The effect of the aftercare component through the use of the follow-up instrument to investigate and quantify post-treatment services
- The effect of different urinalysis regimens during treatment
- The impact of assessment at intake, with emphasis on the interplay between assessment activities at intake and the use of treatment plans and client matching
- The extent and impact of clients receiving services they did not need and would not benefit from
- Whether alternate conceptualizations of treatment components yielded similar results; such a finding would increase confidence in the results reported here.

Implications for policy and practice that can be drawn from these results are:

- The positive relationships with hours per month in group and individual counseling, the percentage of needed educational and vocational counseling received, and substance and alcohol medications suggest that greater treatment intensity in short-term residential SDUs can improve treatment outcomes.
- Longer lengths of stay may enhance treatment outcomes in non-methadone outpatient and long-term residential modalities, even when patients do not complete treatment.

- Clients who see and participate in the development of their treatment plans can potentially enhance treatment outcomes with little cost or risk. We found little evidence that it was generally helpful or that it diverted resources from other treatment strategies, and little evidence that it was generally helpful in all modalities.

- Matching clients to counselors or key providers appears to improve treatment outcomes in methadone maintenance and correctional modalities but not in long-term residential facilities.

- The apparent effectiveness of treatment components like counseling hours per month, employment and vocational services, and substance and alcohol medications var considerably by modality. This suggests that modality should be taken into account before recommending implementation or expansion of these components.

I. Introduction

I. INTRODUCTION

1. STATEMENT OF THE PROBLEM

How different amounts and components of treatment affect substance and alcohol abuse treatment outcomes is fundamentally important to evaluating current treatment practices and improving treatment in the future. Additionally, understanding the interaction between client severity, client characteristics, and treatment components can point to more effective treatment strategies. However, understanding relationships between treatment components and outcomes is complicated by a number of factors: 1) different populations respond to different treatment components, 2) it is difficult to tease out the effects of specific components in a comprehensive treatment environment without experimental designs that isolate those components, and correspondingly, 3) it is difficult to control for client self-selection into treatment services.[1] Yet the relationship between treatment components and outcomes is something that the treatment field must understand better. The downstream implications for the treatment communities (e.g., practice guidelines), the behavioral health care industry (e.g., managed care organization coverage of substance abuse treatment), and of course the clients (more cost-effective treatments and increased quality of life) are enormous.

2. THE PRESENT STUDY

The National Treatment Improvement Evaluation Study (NTIES) provides an excellent vehicle for examining these issues in naturalistic treatment settings. The NTIES surve (described in Appendix A) was a 5-year longitudinal study of the impact of substance abuse treatment on a total of 5,388 clients purposively sampled from public substance abuse treatment programs (service delivery units or SDUs) that were funded by the Center for Substance Abuse Treatment (CSAT). Data were collected from five SDU modalities: methadone maintenance, non-methadone outpatient, short-term residential, long-term residential, and correctional.

The present study uses a multilevel random-effects analysis to model the effect of treatment components on dichotomous outcome measures—abstinent at follow-up from a

[1] For example, it is possible to show no relationship, or even inverse relationships, between intensity of services and outcomes (Orwin et al., 1994). The "worse-off" clients can require the most services, yet because they are worse off initially, their prognosis is poorer. Hence the need for case-mix adjustment as a means of controlling for client severity.

substance for which the client sought treatment and abstinent from all substances.[2] Components were drawn from items in the data set that pertain to prominent issues in substance and alcohol treatment literature. The primary goal of this analysis was to evaluate measures that are meaningful and usable in the field, not just to identify a closely related set of variables in the NTIES data set. It sought to understand the response by NTIES clients to components of substance and alcohol treatment defined in ways that have external applicability and that are immediately available to care providers.

3. STUDY QUESTIONS

The present study addresses the following specific questions:

- What treatment components appear to improve outcomes, and how do these relationships vary by modality?
- What interactions occur between client-level factors and treatment components
- How much do the treatment components improve prediction of good outcomes
- What are the implications for future research, policy, and practice

[2] Operational definitions of abstinence and other terms are described in Chapter I. Methods. General terms regarding NTIES are defined in Appendix A.

II. Methods

II. METHODS

This section describes the sample, outcome measures, background and treatment components, and the statistical techniques used in the analysis.

1. DESCRIPTION OF THE SAMPLE FOR ANALYSIS

The NTIES data set contained 4,411 clients with intake and follow-up data with treatment outcomes. However, only 3,681 of this number also had exit questionnaires, and only 61 of the 71 SDUs from which the 4,411 clients were drawn had Baseline Administrative Forms (NBAR), a self-administered questionnaire typically completed by the SDU director.

This analysis drew from all sources within the NTIES data set, and as a result was based on a subset of 3,085 clients with follow-up for whom all the necessary information was available. A total of 3,085 clients were used, after excluding 451 clients from SDUs with no NBAR information, 730 clients without an exit questionnaire, and 145 clients with unknown information on the variables included in final models. Generally, variables with 30 percent missing data were excluded from analysis, but this was not always possible when several variables describing relatively rare events and presenting ambiguous missing codes were combined for analysis (see Appendix C for additional details).

2. OUTCOME MEASURES

Two outcome measures were defined: "Treatment Substance Abstinent" defined a positive outcome as being abstinent at follow-up from any of the substances for which the client presented, while "All Substance Abstinent," was more restrictive, requiring the client to be abstinent from all substances at follow-up. By "substance," we included all substances plus alcohol (but not tobacco). So, for example, treatment substance abstinence would treat a client who gave up heroin for cocaine as a positive outcome, despite research indicating that addicts may try to modulate mood with cocaine or other substances when they can no longer do so with heroin (CSAT, 1993). In the NTIES data, however, substitution of a more serious substance was rare, and substitution of a comparable substance relatively uncommon.[3] In most cases, therefore,

[3] Ten clients who presented for crack reported using heroin at follow-up but not crack, and 4 who presented for alcohol or marijuana reported using crack, cocaine, or other substances at follow-up but not alcohol or marijuana. Additionally, 53 clients reported using crack after treatment for cocaine, and 15 used cocaine after treatment for crack.

treatment substance abstinence represented harm reduction. For both outcome variables, as specified in the original survey (NORC, 1997), "abstinent" was defined as trying the substance fewer than five times during the year-long follow-up period.

Of the 3,085 clients used in this analysis, 1,411 (46%) were "Treatment Substance Abstinent" and 972 (32%) were "All Substance Abstinent." Exhibit II-1 presents treatment outcomes by modality.

EXHIBIT II-1
TREATMENT OUTCOMES BY MODALITY

	METHADONE (n=295)	NON-METHADONE OUTPATIENT (n=927)	SHORT-TER RESIDENTIAL (n=678)	LONG-TERM RESIDENTIAL (n=575)	CORRECTIONAL FACILITIES (n=610)	TOTALS (n=3,085)
Treatment Substance Abstinent	90 (31%)	432 (47%)	288 (42%)	283 (49%)	318 (52%)	1,411 (46%)
All Substance Abstinent	47 (16%)	328 (35%)	189 (28%)	214 (37%)	194 (32%)	972 (32%)

3. BACKGROUND VARIABLES

Treatments may vary in their applicability to different subgroups. Generally, analyses can treat these groups as special cases and analyze them separately, but this can greatly reduce the statistical power of the models as cells are repeatedly subdivided. Preliminary modeling indicated that stratification beyond the five modalities would adversely affect statistical power. As a result, age, gender and pregnancy status, education, race, and ethnicity were included in modeling as background variables and are listed in Exhibit II-2. Additionally, clients' primary substance, treatment completion status, prior treatment, medical and mental conditions, and legal pressures were also included as background variables, consistent with the original analysis (NORC, 1997).

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EXHIBIT II-2
BACKGROUND VARIABLES USED IN LOGISTIC REGRESSION MODELS

BACKGROUND VARIABLES	
Description	**Data Source(s):**
Age	Race/Ethnicit
Race/Ethnicit	Race (R44 - NRIQ)
Hispanic	Hispanic Origin (R43 - NRIQ) Languages Spoken (R47 - NRIQ) Language Preferred (R50 - NRIQ)
Gender	Gender (R29 - NRIQ)
Pregnancy Status	Pregnant at Intake (R470)
Years of Education	Highest Grade Attended (R58 - NRIQ)
Prior Treatment Episode	Prior Alcohol Treatment (R255 - NRIQ) Prior Drug Treatment (R256 - NRIQ)
Treatment Completion	Analysis file (TXCOMPL)
Legal Pressure to Seek Treatment	Drug Treatment Recommended by CJS (R373 - NRIQ)
Comorbid Medical Conditions	Medical Conditions (R427 - NRIQ) Client Diagnosed with AIDS (R428 - NRIQ) Client Has Other Health Problems (R429 - NRIQ) No. of Nights in Hospital (R454A1 - NRIQ) No. of Visits to ER (R454A2 - NRIQ) No. of Visits to Doctor's Office/Clinic (R454A3 - NRIQ) Was Drug/Alcohol Reason for Visits (R456A1-A3 - NRIQ)
Comorbid Mental Health Conditions	Panic Disorder (R289 & R294 - NRIQ) Depression (R297 & R298 - NRIQ) Suicidal Tendencies (R302, R303, R306, R307) Hallucinations (R309) ADDH (R313A1-A3)
In Treatment for Heroin	(R113M9 - NRIQ)
In Treatment for Cocaine	(R113M4 - NRIQ)
In Treatment for Alcohol	(R113M12 - NRIQ)

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4. TREATMENT COMPONENTS

The following describes each component of treatment used in the model.

4.1 Length of Stay in Treatment

Total length of stay in treatment has shown a positive relationship with post-treatment outcomes (De Leon, 1991; Etheridge, Craddock, Dunteman, & Hubbard, 1995; Hser, Anglin, & Liu, 1991; McKusker, Stoddard, Frost, & Zorn 1996; Tims, Horton, Fletcher, & Price, 1992). This component was defined as the length (in days) of the patient's treatment episode.

4.2 Individual and Group Counseling (Hours Per Month)

Total time spent in individual, group, and family counseling, and total time spent in classrooms was investigated as a treatment component. Numerous studies discuss the effect of counseling on outcome (e.g., Brochu, Landry, Bergeron, & Chiocchio, 1997; Daley, Sallourn, Zuckoff, Kinisci, & Thase, 1998; McLellan et al., 1994; Ouimette, Ahrens, Moos, and Finney, 1998), and it is an aspect of treatment that is relatively easy to quantify. Total time normall spent in counseling sessions is reported by treatment staff in administrative questionnaires. Time spent in counseling is reported for individual clients by staff members in a patient abstract questionnaire and by clients themselves in exit questionnaires. To include the largest number of clients in the analysis, a variable was constructed using all available information, using first the self-reported data, then the data reported about the client by staff, and then the administrative information.

4.3 General Measures of Substance and Alcohol, Medical, and Mental Health Treatment

Two variables depicting general substance and alcohol treatment were defined from the client-reported exit questionnaire. These were: 1) whether clients reported going to Cocaine Anonymous (CA), Narcotics Anonymous (NA), or Alcoholics Anonymous (AA) during treatment, and 2) whether clients reported they took prescribed substance and alcohol medications during treatment.

Three other variables identified clients who received HIV and TB testing, necessar medical care, and mental health care. Clients were deemed to have received treatment for

medical conditions if they reported that they received any kind of medical services.[4] Treatment for mental health conditions was based upon the client's self report at exit of "counseling or treatment for problems with your emotions, nerves, or mental health."

4.4 Ancillary and Supportive Services

The amount and quality of treatment services has been shown to predict outcomes (APA, 1995). In addition to group and individual counseling, services focusing on interpersonal skills, family counseling, child care, and parenting skills are provided in all modalities depending upon client need. Two indices were constructed to handle important ancillary services that SDUs offer but that may not always be needed by all clients. Generally, whether a client received a service was taken from self-reported information in the exit questionnaire, and whether the service was needed by the client was determined using the client's stated priorities at intake. The first index was defined to address social and family needs: family counseling, interpersonal skills counseling, parenting counseling, and child care. A proportion was derived using as the denominator the number of four kinds of family services that had been met or were reportedl needed at intake. The numerator was defined as the actual number of services received. The four kinds of family services are as follows. Clients were asked at exit if they received:

- Individual, group, or family counseling for family problems (it was deemed needed if at index he/she stated that counseling for abuse or help with other family problems was very important to him/her)
- Help with interpersonal skills (it was deemed needed if he/she stated at intake that help getting along with people was very important to him/her)
- Counseling or classes for child rearing (it was deemed needed if at intake he/she stated that training about raising children is very important to him/her)
- Child care or money for child care (it was deemed needed if at intake h/she stated he/she has difficulty getting child care).

For example, if a client reported at intake that child care and interpersonal skills were ver important, but received only child care services, an index of 0.5 or 50 percent was calculated. If the same client also received classes for child care, child care would be added to both the

[4] The condition or injury that required medical attention was not identified, but clients with pre-existing medical conditions were identified with one of the background variables.

numerator and the denominator for an index of 66 percent, since it was assumed that services received were needed.[5] The second index is based upon vocational, educational, legal, housing and transportation services, and assistance in securing financial benefits. It was constructed in the same fashion from the following six elements. Clients were asked at exit if they received:

- Help with educational services (it was deemed needed if at intake the client had less than a high school education)
- Help with employment skills (it was deemed needed if at intake the client stated that employment counseling was very important to him/her)
- Help with housing (it was deemed needed if at intake the client stated that help with housing was very important to him/her)
- Help with legal problems (it was deemed important if at intake the client was on probation, parole, work release, or had been recently released)
- Help to get benefits from the government (it was deemed needed if at intake the client stated that help financial problems was very important to him/her)
- Help with transportation (it was deemed needed if at intake the client stated that he/she thought transportation problems might make it hard for him/her to get treatment).

4.5 Matching

Matching has been described as the process of individualizing treatment resources to patient needs and preferences (CSAT, 1995). It has also been described as a placement criteria for selecting which treatment setting and intensity is appropriate, as described in the American Society of Addiction Medicine placement criteria (CSAT, 1994). Within the NTIES data set, client-treatment matching is addressed only in the administrative questionnaire, in which staff members described their program. Moreover, the questionnaire only asks whether the program matches all, most, or some clients, and it does not distinguish which clients are matched. For this analysis, a client was deemed to have benefitted from the practice of matching if the SDU reported that it matched all or most clients.

[5] Potential problems with this assumption are addressed in the limitations section.

4.6 Treatment Plans

A formalized treatment plan is required by Federal methadone regulations, the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), and the Commission on the Accreditation of Rehabilitation Facilities (CARF) (CSAT, 1994).

Clients were asked whether they saw "a treatment plan or a list of treatment goals" in the exit questionnaire. It describes a treatment plan as something that "can include things such as getting off substances, not using alcohol, improving your health, or getting a job," and does not present it as a formally developed, written document. However, it serves as an indication of the priority placed on treatment planning throughout the client's care and was included as a dichotomous treatment component.[6]

4.7 Average Weekly Methadone

Average weekly methadone dosage was used as a treatment component for the methadone modality only. Methadone dosage is recorded in the NTIES data set with date and daily dose in milligrams. The manner in which the information was filled out depended upon the length of time the client was in treatment, so that a client's dose might be recorded every day, week, or month. Average dosage at any given point in time was extrapolated from these "benchmarks."[7]

4.8 Other Medications

Two general categories of substances—analgesics and antianxiety medications—were defined dichotomous treatment components based upon the staff-reported information in the client abstract.[8]

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[6] Questions about treatment plans also appear in the administrative questionnaire, however their wording makes it difficult to distinguish nonresponses from responses intended to be negative, and whether or not informal treatment planning is included.

[7] Methadone maintenance often begins with a dose adjustment. The "State Methadone Treatment Guidelines" (CSAT, 1993) states that "an initial (methadone) dose of 20-30 mg is usually safe" to relieve withdrawal. Dose changes to reach the tolerance threshold were ignored in favor of the level reached for long-term maintenance, which was assumed to begin in the fourth week of treatment.

[8] The use of other prescribed medications was too incompletely reported to be used.

5. STATISTICAL ANALYSIS

5.1 Descriptions of Treatment Component Distributions

Descriptive statistics were computed on all treatment components by modality and b SDU within modality. Modality means were tabled, and the distributions of SDU means b modality were plotted and described.

5.2 Logistic Regression Models

The impact of treatment components was evaluated using logistic regression. Adjusted odds ratios $(P/1-P)_{\text{received treatment component}} / (P/1-P)_{\text{did not receive treatment component}}$ were calculated b exponentiating each coefficient from the final model. Model fit and comparisons between models with and without treatment components were evaluated with two "goodness of fit" measures. Model improvement was evaluated using the difference in the -2 log likelihood of each model, and estimates of the total variance accounted for by each model before and after treatment components also were examined (Hosmer & Lemeshaw, 1989).

To account for clustering within each service provider, logistic regression modeling used restricted maximum likelihood estimation and the SAS macro GLINMIX. Within each separate model for each modality, SDU was included as a random error term, and treatment components measured at the individual level were treated as fixed effects.

First-order interactions among all treatment components and between treatment components and selected background variables (age, gender, race/ethnicity, and treatment completion) were examined one at a time and initially included in the models if their p value was 0.10 or less. Some interaction terms no longer met the $p<0.10$ criteria after other interaction terms were included and were removed. Since no specific interactions were predicted a priori, and the examination of a large number of possible interactions potentially capitalizes on chance, these analyses should be viewed as strictly exploratory.

III. Results

III. RESULTS

This section presents the results of the study analyses. The sections include distributions of the treatment components and their contribution to the logistic regression models.

1. DISTRIBUTIONS OF TREATMENT COMPONENTS

Exhibit III-1 presents, for each modality, the means of continuous treatment components such as length of stay and hours per month of counseling, means of percent needed services received, and percentage of clients meeting criteria of categorical treatment components. The distribution of SDU means within each modality for the various components appear in Appendix B.

As expected, mean length of stay was highest in the methadone SDUs, where clients could often remain in maintenance indefinitely. Non-methadone outpatient and long-term residential were the next longest (127 and 107 days, respectively). Short-term residential and correctional facilities were the shortest (50 and 70 days, respectively) and also had the least variability across SDUs (see Appendix B, Exhibit B-1). On the other hand, short-term residential and correctional facilities clients had the highest mean hours per month of counseling with their principal provider (17.0 and 17.6, respectively) as well as the most variability across SDUs (see Appendix B, Exhibit B-2), while methadone clients had the lowest means (5.1) with little variability across SDUs. In addition, short-term residential, long-term residential, and correctional facilities clients were the most likely to attend AA, NA, or CA meetings (on average), while methadone and non-methadone outpatient clients were the least likely. On balance, then, there appears to be an inverse relationship across modalities between treatment duration and treatment intensity. Within-modality variability on meeting attendance was substantial in all modalities, however, with SDU mean percentages ranging from 0 to 100 in non-methadone outpatient and long-term residential, and 3 to 100 in short-term residential (Appendix B, Exhibit B-3). Save for one short-term residential outlier, only methadone SDUs provided high percentages of clients with medications to treat their substance abuse problem (Appendix B, Exhibit B-4).

The percent of clients who needed medical treatment and received it was highest in the two residential modalities (83 and 73 percent in short- term and long-term, respectively). The highest variability across SDUs within modality was in non-methadone outpatient programs, where means ranged from 0 to 100 percent (Appendix B, Exhibit B-5). Variability also was high in the methadone and long-term residential modalities. The percent of clients who needed mental health treatment and received it also was highest in the two residential modalities (32 and

EXHIBIT III-1
TREATMENT COMPONENTS BY MODALITY

	METHADONE	NON-METHADONE OUTPATIENT	SHORT-TER RESIDENTIAL	LONG-TERM RESIDENTIAL	CORRECTIONAL FACILITIES
Mean Length of Sta (days)	302	127	50	107	70
Mean Individual and Group Counseling (hours per month)	5.1	11.5	17.0	11	17.6
Attended AA, NA, or CA Counseling	38%	60%	78%	94%	89%
Received Substance and Alcohol Medications	90%	5%	9%	3%	<1%
Received TX for Medical Conditions	44%	46%	83%	73%	67%
Received TX for Mental Health Conditions	17%	23%	32%	31%	25%
Received HIV and TB Testing	82%	28%	25%	42%	28%
Mean % Received of Interpersonal, Family, Child Care, and Parenting Needs	28%	35%	47%	59%	47%
Mean % Received of Educational, Legal, Vocational, Transp. and Housing Needs	22%	34%	27%	58%	38%
SDU Matches All or Most Clients	90%	62%	74%	58%	27%
Client Saw His/Her Treatment Plan	82%	74%	75%	80%	83%
Client Given Analgesics	2%	2%	19%	12%	8%
Client Given Anti-anxiety Medications	1%	2%	3%	1%	1%

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31 percent in short-term and long-term, respectively). However, there was high variability across long-term residential SDUs on this dimension, with means ranging from 7 to 100 percent (Appendix B, Exhibit B-6). Variability also was also high across non-methadone outpatient SDU means (0 to 67 percent). Clients in methadone clinics were two to three times as likely to receive diagnostic HIV or TB testing than any other modality, while non-methadone outpatient and long-term residential facilities had the highest variability across SDUs (Appendix B, Exhibit B-7).

On the family counseling, interpersonal, parenting, and child care services index as well as the high school, vocational, legal, financial, housing, and transportation services index, long-term residential clients received the most services (mean scores of 59 and 58 percent, respectively) while methadone clients received the least (28 and 22 percent). This is consistent with expectations from the literature that long-term residential care affords the best opportunit for providing ancillary or "wraparound" services once clients are in recovery, while outpatient methadone clinics (which primarily exist to provide methadone) tend to focus on these. In all modalities other than methadone, the variability across SDUs was higher on the first index than the second (See Appendix B, Exhibits B-8 and B-9).

Methadone SDUs were the most likely to use patient matching as part of treatment (Exhibit III-1), while correctional facilities were the least likely to use matching. Mean differences between modalities on "patient saw treatment plan" were small (only 8 percentage points separated the highest from the lowest), although variability across SDUs within modalit differed substantially. Means in non-methadone outpatient SDUs ranged from 0 to 100 percent, compared to 64 to 91 percent in methadone SDUs (Appendix B, Exhibit B-10).

2. CONTRIBUTION OF TREATMENT COMPONENTS TO LOGISTIC REGRESSION MODELS

Over and above the client background variables, adding the treatment components significantly improved the models in non-methadone outpatient and short-term residential modalities for both outcomes and for methadone maintenance for substance treatment abstinence. Improvement was marginal for the long-term residential modality, with a p value of .054 for treatment substance abstinence and .095 for all substance abstinence. Including treatment components did not improve the models for correctional facilities.

Exhibits III-2 and III-3 present odds ratios of the treatment components for analyses of treatment substance abstinence and all substance abstinence, respectively. The interactions

included for each modality appear under the variables from which they were constructed; for example, an interaction term calculated as the product of hours per month in counseling and percent of social/family counseling needs met appears twice in the exhibits under each treatment component. Exhibit III-4 presents estimates of the explained variance (pseudo R^2) for background models and improvement due to the treatment components and interactions.

EXHIBIT III-2
TREATMENT COMPONENTS AND MULTIVARIATE ODDS RATIOS OF TREATMENT SUBSTANCE ABSTINENCE

COMPONENT	METHADONE	NON-METHADONE OUTPATIENT	SHORT TERM RESIDENTIAL	LONG-TERM RESIDENTIAL	CORRECTIONAL FACILITIES
Length of Stay	1.002	1.004**	1.000	1.003*	1.001
With Treatment Completion	-	0.995*	-	-	-
Hours/mo in Group/Indiv	0.901^	0.996	1.044**	0.933*	1.009
With %Met: Social/Family	1.002^	-	-	1.001*	-
With %Met: Empl/Educ/Leg/Hsng	-	-	0.999*	1.001*	-
With Female Gender	-	-	-	0.924**	-
Attended AA, NA, or CA	0.717	1.071	0.857	1.671	1.520
With Treatment Completion	-	2.908**	0.269*	-	-
Received Substance and Alc Meds	0.565	0.554	2.422*	0.737	0.759
With Female Gender	-	-	0.048**	-	-
Medical Treatment	1.333	1.096	0.743	1.095	0.884
With Analgesics	-	-	-	3.481^	-
Mental Health Treatment	0.645	0.760	0.860	0.941	0.845
HIV and TB testing	0.659	0.844	0.743	0.572**	1.140
%Met: Social/Family	1.001	1.002	1.001	0.993	1.002
With Hours/mo in Group/Indiv	1.002^	-	-	1.001**	-
With Female Gender	0.980*	-	-	-	-
%Met: Empl/Educ/Leg/Hsng	0.985*	0.997	1.018*	0.995	0.997
With Hours/mo in Group/Indiv	-	-	0.999*	1.001*	-
SDU Matches All or Most Pts	8.521*	0.861	1.929^	0.469**	3.980**
Saw Treatment Plan	3.052*	1.097	1.674^	1.126	1.637^
With Female Gender	-	-	0.430^	-	-
Received Analgesics	2.032	2.835	0.751	0.216*	0.902
With Medical Treatment	-	-	-	3.481^	-
Received Antianxiety Meds	0.639	0.199*	3.692*	1.170	8.537
Avg. Methadone Dose	1.003	-	-	-	-

Interaction terms shown in italics.

^ p▸0.10.

* p▸0.05.

**p▸0.01.

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EXHIBIT III-3
TREATMENT COMPONENTS AND MULTIVARIATE ODDS RATIOS OF ALL SUBSTANCE ABSTINENCE

COMPONENT	METHADONE	NON-METHADONE OUTPATIENT	SHORT-TERM RESIDENTIAL	LONG-TERM RESIDENTIAL	CORRECTIONAL FACILITIES
Length of Stay	1.001	1.005**	0.999	1.004*	1.002
With Treatment Completion	-	0.994**	-	-	-
Hours/mo in Group/Indiv	0.793*	0.989	1.046**	0.988	1.012
With %Met: Social/Family	1.003*	-	-	1.000	-
With %Met: Empl/Educ/Leg/Hsng	-	-	0.999*	1.000	-
With Female Gender	-	-	-	0.955^	-
Attended AA, NA, or CA	0.963	1.133	0.912	1.572	1.323
With Treatment Completion	-	2.933**	0.236*	-	-
Received Substance and Alc Meds	0.344	0.778	2.324^	0.890	1.665
With Female Gender	-	-	0.056**	-	-
Medical Treatment	1.100	1.057	1.221	0.813	0.966
With Analgesics	-	-	-	3.537	-
Mental Health Treatment	0.507	0.749	0.780	0.999	0.928
HIV and TB testing	0.953	0.732	0.591*	0.773	1.151
%Met: Social/Family	0.999	1.006**	1.001	1.007	1.006*
With Hours/mo in Group/Indiv	1.003*	-	0.999*	1.000	-
With Female Gender	0.990	-	-	0.955	-
%Met: Empl/Educ/Leg/Hsng	0.986	1.000	1.023**	1.002	0.997
With Hours/mo in Group/Indiv	-	-	-	1.000	-
SDU Matches All or Most Pts	19.94*	0.900	1.483	0.507^	3.215*
Saw Treatment Plan	3.062	1.211	2.444*	1.023	1.323
With Female Gender	-	-	0.228**	-	-
Received Analgesics	1.927	1.241	0.834	0.204*	0.695
With Medical Treatment	-	-	-	3.537	-
Received Antianxiety Meds	-	0.118^	4.479*	0.553	8.640*
Avg. Methadone Dose	0.999	-	-	-	-

Interaction terms shown in italics.

[1]Model for Methadone Maintenance modality did not meet convergence criteria.

^ p▸0.10.

* p▸0.05.

**p▸0.01.

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EXHIBIT III-4
PERCENT OF VARIANCE EXPLAINED BY BACKGROUND AND BACKGROUND + TREATMENT LOGISTIC REGRESSION MODELS

	METHADONE	NON-METHADONE OUTPATIENT	SHORT-TERM RESIDENTIAL	LONG-TERM RESIDENTIAL	CORRECTIONAL FACILITIES
Treatment Substance Abstinence *Background* R^2	8.7	11.8	8.4	7.9	12.1
Background+Treatment R^2	16.1	14.7	12.9	11.6	13.4
All Substance Abstinence Background R^2	NA	5.3	4.9	8.6	4.0
Background+Treatment R^2	NA	9.9	11.3	12.2	5.6

Below, we describe the effects separately by modality.

2.1 Methadone

For the methadone modality, SDU matching was significant and positive with high odds ratios for both outcomes (see Exhibits III-2 and III-3). Seeing the treatment plan was positive and significant at a 0.05 level for treatment substance abstinence and positive but not significant for all substance abstinence. Hours per month in group and individual counseling was negative for both outcomes but only significant for all substance abstinence (the p value for treatment substance abstinence was 0.0525). The percentage of needed family and interpersonal services received was not significant by itself, but the interaction between this component and counseling hours was significant and positive in all substance abstinence, tending to mitigate the negative effect of counseling when there is a high percentage of satisfied social and family counseling needs.

The percentage of needed educational and other ancillary services received was significantly and negatively associated with treatment substance abstinence. This negative finding may suggest that these services compete with other priorities in a more medicall

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intensive environment. As suggested in Exhibit III-3, such services may not be priorities in a methadone setting. Average methadone dose, applicable to this modality only, was not useful in predicting outcome. The average methadone dose for these clients, leaving out the effect of dose calibration in the first 2-3 weeks, is 45-50 mg. This is in the low range of what currently is regarded as effective (CSAT, 1993), and the variation in these data is somewhat limited.

2.2 Non-Methadone Outpatient

For the non-methadone outpatient modality, length of stay is positively and significantl associated with abstinence (both outcomes). This finding is mitigated by an interaction with treatment completion, however, which counters the effect of length of stay when clients complete treatment. Completion of treatment in a long-term outpatient setting may not mean the same thing as it does in other modalities. Treatment completion for this modality is positive (OR=1.7, p=.09 for treatment substance abstinence and OR=2. 1, p<.05 for all substance abstinence), and it is important to remember that the negative interaction effect of 0.994-0.995 only mitigates the other positive effects, suggesting that the combined effect is not simply additive. An interaction with treatment completion also was observed with AA, NA, or CA attendance during treatment, and although the main effect is not significant, it suggests that in this modality attendance at AA, NA, or CA meetings may be more beneficial among clients who complete treatment. The percentage of needed social and family services received is significant (p<.05) and positive for all substance abstinence but not for treatment substance abstinence, which implies that family and interpersonal supports may be most effective in achieving complete abstinence. Receiving anti-anxiety medications is negatively associated with both outcomes (at a significant level of .05 for treatment substance abstinence 0. 10 for all substance abstinence), possibly because of tolerance issues that emerge in long-term, outpatient settings or because clients who needed such agents were among the most difficult to treat. (Recall from Exhibit III-I that very few non-methadone outpatient clients reportedly received these medications.)

2.3 Short-Term Residential

Short-term residential modalities show positive, significant associations for both outcomes with hours per month in counseling and percentage of educational, vocational, and other ancillary services received, although an interaction between the two slightly reduces their combined effect. Short-term residential also is the only modality that presents positive and significant effects for substance and alcohol medications, although for all substance abstinence,

this is only significant at 0.10. Receiving anti-anxiety medications also was positive and significant. Whether clients saw their treatment plans was significantly positive for both outcomes (increasing the odds of success by 67 and 144 percent on treatment and all substance abstinence, respectively). SDU matching was positive but significant only at 0. 10 and only for treatment substance abstinence, where matching increased the odds of success by 93 percent). One puzzling finding is the negative interaction between AA, NA, and CA attendance and treatment completion. This is in contrast to non-methadone outpatient SDUs where treatment completion in combination with AA, NA, and CA increases the odds for abstinence. Generally, those treatment components that are significant and positive for this modality imply better outcomes with more intensive treatment: more hours per month in group and individual counseling, more substance and alcohol medications, more ancillary services, and anti-anxiet medications. One complication to this picture is the interaction of gender with substance and alcohol medications and with treatment plans which suggests that men may have benefitted more from these medications and from seeing their treatment plans. Note that the odds ratios in Exhibits III-2 and III-3 are coded to describe women, and that the inverse describes the likelihood for men. Women account for 33 percent of clients in short-term residential facilities, and overall show a greater likelihood of abstinence (OR=3.3, $p<.001$ in both outcomes).

2.4 Long-Term Residential

Long-term residential modalities show positive and significant associations with length of stay for both outcomes. This is the only modality in which SDU matching is significantl negative (0.10 for all substance abstinent), but that may reflect differences in the way matching is accomplished and the purposes it serves in a long-term setting. This also is the only modalit with a significant and negative result for HIV and TB testing (treatment substance abstinence). Interactions were found for treatment substance abstinence between hours per month in group and individual counseling and the percentages of needed services (social/family and empl/educ/leg/hsng) that were received. For treatment substance abstinence, hours per month in abstinence and hours per month in counseling is significantly and negatively associated with abstinence, while high values both for hours in counseling and percentages of needed services that were received counter the effect. An interaction ($p=.09$) was observed between receiving analgesics and receiving medical treatment, suggesting that analgesics are associated with positive outcomes in combination with medical treatment but negative without medical treatment.

2.5 Correctional

Correctional facilities modalities show positive and significant effects for SDU matching on both outcomes (increasing the odds of abstinence by a factor of three), and for the percentage of needed family and interpersonal services met in all substance abstinence. Anti-anxiet medications show a positive and significant effect for all substance abstinence. No significant interactions were uncovered for this modality.

IV. Summary and Conclusions

IV. SUMMARY AND CONCLUSIONS

This section of the report provides answers to the questions posed in the Introduction. Also presented are sections detailing the limitations that must be considered in interpreting the results and some implications for further analysis, policy, and practice.

1. ANSWERS TO STUDY QUESTIONS

1.1 What treatment components appear to improve outcomes, and how do these relationships vary by modality?

- Several treatment components were shown to have significant effects on the odds of a positive outcome both on treatment substance and all substance abstinence. Despite a difference of 439 clients, the effects of treatment components on treatment substance abstinence and on all substance abstinence are very similar.

- Length of stay shows a consistently positive effect both on treatment substance and all substance abstinence, consistent with expectations from the literature. However, the effects were statistically significant in the Non-methadone outpatient and Long-term residential modalities only. In these modalities, the odds ratios suggest that controlling for other variables, increasing length of stay by 30 days can improve the odds of a successful outcome by as much as 15 percent. The absence of length-of-stay effects in short-term residential settings is understandable, given that these all tend to be standard 28-day programs based on the chemical dependency model.

- Whether clients reported seeing their treatment plan was also consistently positive across all modalities, though statistically significant in only two. Seeing treatment plans significantly increased the odds of all-substance abstinence in Methadone modalities by 200 percent (OR=3.052) and by 144 percent (OR=2.444) in short-term residential modalities.[9]

- Percent of needed interpersonal and family services received was mostly positive across outcomes and modalities but was significant only for all-substance abstinence.

- As a main effect, hours per month in group and individual counseling had a significant positive effect in the short-term residential modality only. Educational, vocational and other ancillary services, the use of antianxiety and substance and alcohol medications, and client matching also had positive impacts on one or both

[9] An analysis of treatment retention using this data set showed seeing the treatment plan to be the most consistent predictor of program completion after controlling for other client and program factors (Orwin & Williams, 1999).

forms of abstinence in short-term residentials SDUs, suggesting that greater treatment intensity may pay off in that modality.

- Other significant findings varied greatly by direction and modality. Methadone SDUs showed positive and significant associations with SDU matching. Non-methadone outpatient SDUs showed positive effects of needed family, interpersonal, parenting and child care services that were met. Long-term residential SDUs showed negative effects for matching while correctional SDUs showed positive effects. As noted earlier, the negative relationship of matching in long-term residential SDUs ma reflect differences in the way matching is accomplished and the purposes it serves in a long-term setting. It also may mean that matching is more prevalent in SDUs serving more difficult clients.

- One difference between the two endpoints is the significance and strength of social and family services in non-methadone outpatient and correctional facilities modalities. This component is significant and positive in all-substance abstinence but not in treatment-substance abstinence. Much of this is due to poorer model fit for short-term residential and correctional facilities modalities for all-substance abstinence, as shown in Exhibit III-4. However, it may also suggest an investigation as to whether interpersonal skills or family supports are more effective for total abstinence and more useful in reducing cross-addiction and substance substitution.

1.2 What interactions occur between client-level factors and treatment components?

- Significant interactions were observed between hours in group or individual counseling with the percent of needed social/family services received and the percent of needed employment/educational services received. Generally, the interactions with these two indices tend to mitigate the effects of hours per month in group or individual counseling, in that the interaction terms are positive when the effect of hours per month is negative (methadone, long-term residential) and negative when the effect of hours per month is positive (short-term residential). An additional interaction (significant at $p<.10$) was found between receiving analgesics and receiving medical care for the long-term residential modality.

- Background variables found to interact with treatment components were gender and treatment completion. While women were significantly more likely to be abstinent in most modalities, the positive effects of hours per month in counseling, substance and alcohol medications, percent of needed services received, and treatment plans appeared to differentially benefit men. This suggests that providers may need to offer more tailored approaches to these services so that women benefit as well. Studies indicate that women clients are more responsive to interventions aimed at self-esteem,

anxiety, and depression (Bartholomew, Rowan-Szal, Chattam, & Simpson 1994), so that adjusting for women's overall rate of abstinence may have left a residual group resistant to more intensive treatment or other kinds of treatments.

- Treatment completion interacts with length of stay (non-methadone outpatient) and AA/JNA/CA attendance (non-methadone outpatient and short-term residential). In the case of meeting attendance in the non-methadone outpatient modality, the main effect was not significant while the interaction was positive, suggesting that in this modalit attendance at meetings may be more beneficial among clients who complete treatment. This may reflect the fact that meeting attendance and treatment completion are both manifestations of a single unmeasured factor such as motivation, which in turn may be most likely to affect outcomes in the relatively unstructured environment of outpatient treatment. However, the same interaction was negative in the short-term residential modality, for reasons that are not readily apparent. As noted in Chapter II, Methods, no specific interactions were predicted on the basis of the literature, and caution should be exercised in interpreting them.

1.3 How much do the treatment components improve the prediction of outcomes?

Compared to the background variables alone, the inclusion of treatment components significantly improved the logistic regression models for non-methadone outpatient and short-term residential modalities for both outcomes and for methadone for treatment substance abstinence. Improvement for the long-term residential modality was marginal (p=.054 for treatment substance abstinent and p=.095 for all substance abstinent) and not significant for the correctional modality. Using the background models as the base, adding the treatment components increased the estimated variance accounted for by 1-2 percent in correctional modalities and 3-8 percent in the other modalities.

2. LIMITATIONS

The following limitations should be considered in interpreting these results. Several sensitivity analyses were conducted to assess the potential extent of the limitations on the findings, which are also described:

- In some instances, limitations in the detail in NTIES questionnaires limited the specificit with which treatment components could be defined. For example, reports by clients in the exit questionnaire did not distinguish group and individual counseling, so the two were combined. Also, incomplete responses affected how a component was defined and developed. Several variables were included in modeling because of their treatment importance, but were defined as simple yes/no dichotomies because no further details were available. For example, clients reported going to Cocaine Anonymous (CA), Narcotics Anonymous (NA), or Alcoholics Anonymous (AA) during treatment without distinguishing between the three or reporting the number or frequency of meetings. Similarly, the reported taking prescribed substance and alcohol medications during treatment but did not identify them. Matching appears in substance abuse and treatment literature as a means of determining the least restrictive treatment environment, as a way to ensure that needed services are provided once a client has been placed in treatment, and as a way to select counselors or primary providers that can best meet clients' special needs. The NTIES data set has no information concerning the manner in which clients found their way into their respective SDUs. The data set provides only limited information on the reason for matching and other details once clients were admitted, and does not directly specify which clients were matched. The use of treatment plans also appears both in the literature and in the NTIES data; however, the manner in which the item was interpreted, particularly in the Baseline Administrative Report (NBAR), is unclear, requiring this analysis to focus on whether the client recalled seeing a treatment plan.

- Inferences from non-experimental data are inherently vulnerable to selection bias. In such situations, it is customary to model background variables—e.g., demographics—as a proxy for the selection process (case-mix adjustment). However, this approach has technical drawbacks.[10] Ideally, the problem is addressed by constructing selection models and measurement models and analyzing the data with a structural equation modeling program such as LISREL or EQS. However, the requirements of these models were not met in these data. As an alternative, a hierarchical "set" approach was employed, with the background variables set entered prior to the treatment variables set. The hierarchical approach produces a conservative estimate of the treatment effects, because outcome variance common to both the background variables and the treatment variables are "credited" to the background variables. That is, the background variables

[10] First, it is vulnerable to model misspecification. That is, unless the true selection process is completel "explained" by variation in the background variables (predictors), the adjusted effect estimates still may be biased. Second, the improper adjustment is further exacerbated by measurement errors (unreliability) in the background variables. Such errors bias the effect estimate because the expected value of the adjusted mean difference under the null hypothesis (i.e., no effect) is nonzero. In practice, the analyst typically will not know whether the background variables in a particular analysis over adjust, under adjust, or properly adjust. Apart from internal consistency tests on the severity scales (Cronbach's alpha), the NORC report reported no formal reliabilit assessments of patient self-reports at intake.

are given causal priority over the treatment variables in the hierarchy. The hierarchical approach therefore provides a measure of protection against the misinterpretation of selection bias as treatment effects.

- An analogous issue exists with treatment components. The treatment components at many SDUs look nominally similar: e.g., individual therapy, group therapy, and assorted wraparound services. Yet the way the services are configured (e.g., bundling, sequencing, etc.) may vary, and the variation may reflect attempts to attain different treatment goals and use different therapeutic emphases. However, this variation will not be apparent in the services data themselves. Consequently, the variation that exists between SDUs may be under-specified in the regression models, which can in turn lead to biased estimates of effect parameters.[11] As a personal check against this, we included an additional set of variables representing goals and emphases in the models.[12] These variables were added to the models as a third set in the sequence, after including the client factors and treatment components. As such, this functioned as a sensitivity analysis with the variables serving as proxies for unmeasured residual treatment effects that were not being captured by the observed treatment components. None of the variables significantly contributed to model fit, and in fact many could not be modeled because they were linear combinations of other components. To the extent that this additional set of variables were valid proxies for unmeasured residual treatment, they offer no evidence that unmeasured treatment is biasing effect parameters by causing under-specification of models. However, the possibility remains of unmeasured residual treatment not captured b these variables, the extent and effects of which remain unknown.

- A related issue is whether to measure total treatment only as it was provided and reported by the SD, or to describe dosage received by the SDU and other agencies to which clients were referred. Questions in the NTIES Treatment Experience Questionnaire (NTEQ) ask whether services were provided at the SDU, at a facilit referred to by the SDU, or at an unknown facility. Since this analysis focuses on the effect of treatment components on outcomes without considering the impact of resources or sponsorship, a client was deemed to have received a service even if it was received "somewhere else." The use of client-reported information thus provides additional information on treatment that would not be reported in SDU-level data.

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[11] Measurement error also may be present from differences in the way program administrators interpreted treatment-related questions on the NBAR (e.g., patient matching). The NORC report also cautioned about the accuracy of any single source of information regarding services delivered or received (NORC, 1997).

[12] The baseline administrative interview asked program directors a series of questions regarding 12 potential treatment goals and 12 types of counseling and therapy. It also asked program directors to what extent their programs emphasized each potential goal of treatment and to rank the 5 most important treatment goals. Similarly, they were asked what degree of emphasis programs placed on each type of counseling or therapy. We converted each treatment goal into a dichotomous variable indicating whether it was among the top 5.

However, because of the sketchy nature of these "somewhere else" responses, a comparative sensitivity analysis was done that limited most services to those done at the SDU or referred by the SDU. Re-running these analyses after removing services received "somewhere else" made little impact upon results.

- Problems in convergence for all substance abstinence for methadone and the limited improvement in model fit for the correctional modality limit the confidence that can be placed in findings for these modalities.

- Perhaps the most significant limitation is the inability to place the SDU episode in the context of the client's entire treatment history. Any attempt to compare treatment received with treatment intended ideally should account for what providers consider their mission, and which service providers feel to be part of that mission. Clients referred into or out of one of the participating SDUs because a phase of treatment is not provided may present an incomplete history. Twenty-one percent of clients with follow-up received services from another SDU within 7 days of intake and most received detoxification services. Treatment provided by an SDU may be misunderstood as incomplete or inadequate when actually it was done somewhere else and not reported. The administrative questionnaire asks SDUs which phases of treatment the SDU provides routinely from a list of (1) detoxification, (2) rehabilitation, (3) assessment/intake, (4) steps (from 12 Steps), (5) aftercare, (6) relapse prevention, and five "other specified" phases. Most SDUs said they divide treatment into stages or phases, and that phases they do not provide may be done at another, "linked" service provider. Two-thirds of the clients used in this analysis were treated at SDUs that were "considered one phase of treatment in a sequence of closely affiliated SDUs." Clients may have received additional treatment that is not included in the NTIES data set.

3. IMPLICATIONS FOR FURTHER ANALYSIS, POLICY, AND PRACTICE

3.1 Analysis

The following lists areas for further research that could productively be investigated with the NTIES data:

- This analysis focused entirely on treatment components reported in the administrative report, the intake questionnaire, the treatment exit questionnaire, and the patient abstract. Follow-up instruments were polled for outcome data only. Numerous articles in the literature describe aftercare as a crucial component (e.g., Cougheym, Feighan, Cheney, & Klein, 1998; Hubbard, et al., 1989; Lash and Blosser, 1999) and, in fact, aftercare is cited as a phase of treatment by many providers. Examination of

this treatment component will require use of the follow-up to investigate and quantif post-treatment services such as AA, NA, and CA meetings.

- Studies also emphasize the importance of urinalysis testing during treatment (CSAT, 1995). This was omitted because it is not specifically a treatment component; however, the literature presents this issue as a means of instilling accountability and managing client noncompliance. This issue warrants further study.

- Assessment at intake is also prominent in literature, not as a specific component of therapy but as an overall phase of treatment that is closely related to the use of treatment plans and patient matching. This aspect of treatment should be examined in detail, with emphasis on the interplay between assessment activities at intake and the use of treatment plans and client matching.

- Overutilization of services is a salient issue in today's fiscal environment, with more private and public sector treatment funding shifting to managed care models. In constructing indexes for the present analysis, clients who received specific services were assumed to need them even if they did not express a need for them at intake. This was reasonable given that clients are not the best assessors of their own service needs, particularly at program intake when many are not yet into recovery. However, an alternate scenario—clients receiving services they did not need and would not benefit from—is also a possibility, and its extent and impact could be investigated in these data.

- As stated earlier, the intent of the present analysis was to define treatment components in ways that have external applicability beyond the NTIES data, using variables to define the components that treatment providers could readily manipulate. This does not preclude the existence of other and possibly better ways that treatment can be conceptualized and operationalized in these data. It would be of particular interest to see whether alternate conceptualizations yielded similar results; such a finding would increase confidence in the results reported here.

3.2 Policy and Practice

These results pose the following implications for agencies involved in funding and delivering substance abuse treatment:

- The positive relationships with hours per month in group and individual counseling, the percentage of needed educational and vocational counseling received, and substance and alcohol medications, suggest that greater treatment intensity in short-term residential SDUs can improve treatment outcomes.

- Longer lengths of stay may enhance treatment outcomes in non-methadone outpatient and long-term residential modalities, even when patients do not complete treatment.

- Client participation in the development of their treatment plans can potentiall enhance treatment outcomes with little cost or risk. We found little evidence that it was harmful or that it diverted resources from other treatment strategies, and evidence that it was generally helpful in all modalities.

- Matching clients to counselors or key providers appears to improve treatment outcomes in methadone maintenance and correctional modalities but not in long-term residential facilities.

- The apparent effectiveness of treatment components like counseling hours per month, employment and vocational services, and substance and alcohol medications var considerably by modality. This suggests that modality should be taken into account before recommending implementation or expansion of these components.

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APPENDIX A:

DESCRIPTION OF THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY AND CENTER FOR SUBSTANCE ABUSE TREATMENT DEMONSTRATIONS (1990-1992)

APPENDIX A

DESCRIPTION OF THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY AND CENTER FOR SUBSTANCE ABUSE TREATMENT DEMONSTRATIONS (1990-1992)

The National Treatment Improvement Evaluation Study (NTIES) was a national evaluation of the effectiveness of substance abuse treatment services delivered in comprehensive treatment demonstration programs supported by the Center for Substance Abuse Treatment (CSAT). The NTIES project collected longitudinal data between FY 1992 and FY 1995 on a purposive sample of clients in treatment programs receiving demonstration grant funding from CSAT. Client-level data were obtained at treatment intake, at treatment exit, and 12 months after treatment exit. Service delivery unit (SDU) administrative and clinician (SDU staff) data were obtained at two time points, 1 year apart.

1. THE NTIES DESIGN

The NTIES study design had two levels—an administrative or services component and a clinical treatment outcomes component.

1.1 The Administrative/Services Component

This study component was designed to assess how CSAT demonstration funds were used, what improvements in services were implemented at the program level, and what kind and how many programs and clients were affected by the demonstration awards.

The unit of analysis for the administrative component was the SDU, defined by CSAT as a single site offering a single level of care. The classification of *level of care* is based on three parameters: (1) facility type (e.g., hospital, etc.); (2) intensity of care (e.g., 24-hour, etc.); and (3) type of service (e.g., outpatient, etc.). An SDU could be a stand-alone treatment provider or it could be one component of a multi-tiered treatment organization. For example, a large count mental health agency may be the *organization* within which the SDU is located. The organization may have multiple substance abuse treatment components, such as a county hospital and a county (ambulatory) mental health center. The county hospital may have multiple SDUs, such as an inpatient detoxification service, an outpatient counseling service, and a hospital

satellite center providing transitional care. In summary, the SDU provided NTIES evaluators with a stable, uniform level of comparison for examining service delivery issues.

1.2 Clinical Treatment Outcomes Component

The unit of analysis for the clinical treatment outcomes component was individual client data. NTIES measured the clinical outcomes of treatment primarily through a "before/after" or "pre- to post-treatment" design. This method compares behaviors or other individual characteristics in the same participants, measured in similar ways, before and after an intervention.

Information about clients' lives for the *before* period were obtained from the NTIES Research Intake Questionnaire (NRIQ), which was administered sometime during the clients' first 3 weeks of treatment. The specific areas assessed included:

- Drug and alcohol use
- Employment
- Criminal justice involvement and criminal behaviors
- Living arrangements
- Mental and physical health.

Information about clients' lives for the *after* period were obtained from the NTIES Post-discharge Assessment Questionnaire (NPAQ), with the same areas assessed at roughly 12 months post-treatment. Other client data sources included a treatment discharge interview (NTIES Treatment Experience Questionnaire, NTEQ), abstracted client records, urine drug screens collected at the time of the follow-up interview, and arrest reports from state databases.

1.3 The Outcome Analysis Sample

Between August 1993 and October 1994, research staff successfully enrolled 6,593 clients at 71 SDUs to participate in three waves of an in-person, computer-assisted data collection protocol. These SDUs were chosen from the universe of treatment units receiving demonstration grant funding from CSAT. Some of the selected facilities were wholly supported by CSAT awards, while others received only indirect support or none.

Clients were interviewed at admission to treatment, when they left treatment, and then at 12 months after the end of treatment. Less than 10 percent of the recruited clients refused or avoided participation, and more than 83 percent of the recruited individuals (5,388 clients) completed a follow-up interview. Additional sample exclusions included:

- Missing or undetermined treatment exit date
- Inappropriate length of follow-up interval (less than 5 or more than 16 months)
- Clients incarcerated for most or all of the follow-up period.

The additional sample exclusions resulted in a final outcome analysis sample of 4,411 individuals.

2. TREATMENT DEMONSTRATION PROGRAMS

CSAT initiated three major demonstration programs and made 157 multi-year treatment enhancement awards across 47 states and several territories during 1990 through 1992. One objective common to all demonstrations was CSAT's emphasis on the provision of "comprehensive treatment" services to targeted client populations. The recipients of these awards focused special attention on the substance abuse treatment service needs of minority and special populations located primarily within large metropolitan areas. The demonstration programs are briefly described below.

2.1 Target Cities

Under this demonstration, nine metropolitan areas were selected to receive awards, of which half were included in the NTIES purposive sample. The following treatment improvement activities were explicitly provided for in the awards:

- Establishment of a Central Intake Unit (CIU) with automated client tracking and referral systems in place
- Provision of comprehensive services, including vocational, educational, biological, psychological, informational, and lifestyle components
- Improved inter-agency coordination (e.g., mental health, criminal justice, and human service agencies)
- Services for special populations—adolescents, pregnant and postpartum women, racial and ethnic minorities, and public housing residents.

2.2 Critical Populations

Under this demonstration program, awardees were required to implement "model enhancements" to existing treatment services for one or more of the following critical populations: racial and ethnic minorities, residents of public housing, and/or adolescents. Special emphasis was given to services provided to the homeless, the dually diagnosed, or persons living in rural areas. A total of 130 grants were awarded, covering services such as vocational support/counseling, housing assistance, integrated mental health and/or medical services, coordinated social services, culturally directed services, and others.

2.3 Incarcerated and Non-Incarcerated Criminal Justice Populations

Under this demonstration program, funds were directed toward improving the standard of comprehensive treatment services for criminally involved clients in correctional and other settings. Some program emphasis was placed on ethnic and/or racial minorities. Nine Correctional Setting demonstrations were funded: five in prisons, three in local jails, and one across a network of juvenile detention facilities. All projects included a screening component to

identify substance-abusing inmates, a variety of targeted treatment interventions (e.g., therapeutic communities, intensive day treatment programs), and a substantial aftercare component.

A total of 10 non-incarcerated projects were funded. Five programs targeted interventions at clients in diversionary programs, three focused services on probationers or parolees, and two programs targeted both populations. Almost all of the funded demonstration projects included the following components:

- Basic eligibility determination, followed by systematic screening and assessment
- Referral to treatment
- Graduated sanctions and incentives while in treatment
- Intensive supervision in treatment
- Community-based aftercare with supervision and service coordination.

In total, 19 criminal justice projects were funded as part of the CSAT 1990-1992 demonstrations, and as indicated in the next section, these projects were purposively over-sampled in order to obtain a more robust evaluation of this program..

3. DESCRIPTION OF SDUs AND CLIENTS BY TREATMENT MODALITY AND PROGRAM TYPE

The 71 SDUs contributing clients to the outcome analysis sample are characterized b modality and (demonstration) program type in Exhibit A-1 below. Among the 698 SDUs in the NTIES universe: 52 percent (n=365) were Target Cities programs, 39 percent (n=274) were Critical Populations programs, and 9 percent (n=59) were Criminal Justice programs .

In terms of the SDUs sampled for the NTIES outcome analysis, 44 percent were Target Cities programs, 38 percent were Critical Populations programs, and 23 percent were Criminal Justice programs. Criminal Justice SDUs were purposely over-sampled as part of the NTIES evaluation design (CSAT, 1997). Nearly half of the sampled SDUs were (non-methadone) outpatient programs, and about one-quarter were long-term residential programs.

EXHIBIT A-1
SDUs IN THE OUTCOME ANALYSIS SAMPLE

Program Title Number of SDUs (% of NTIES Universe)[13]	NTIES Sample	Methadone	Outpatient	Long-Term Residential	Short-Ter Residential	Correctional
Target Cities n=365 (52%)	31 (44%)	6	15	6	4	0
Critical Populations n=274 (39%)	27 (38%)	1	13	10	3	0
Criminal Justice n=59 (9%)	13 (23%)	0	5	0	0	8
Totals N=698 (100%)	71 (100%)	7	33	16	7	8

As shown in Exhibit A-2, 59 percent of all NTIES clients were sampled from Target Cities SDUs. Slightly over 21 percent of all NTIES clients were sampled from Critical Populations SDUs and 20 percent were sampled from Criminal Justice SDUs. Outpatient (non-methadone) SDUs treated over one-third (35%) of the clients in the outcomes analysis sample, and almost 80 percent of these were sampled from Target Cities programs.

EXHIBIT A-2
DISTRIBUTION OF CLIENTS IN THE OUTCOMES ANALYSIS SAMPLE

Program Title Number of Clients (% of Analysis Sample)	Methadone	Outpatient	Long-Term Residential	Short-Ter Residential	Correctional
Target Cities n=2,600 (59%)	377 (89%)	1,214 (78%)	504 (60%)	505 (58%)	0
Critical Populations n=931 (21%)	45 (11%)	220 (14%)	298 (35%)	368 (42%)	0
Criminal Justice n=880 (20%)	0	132 (8%)	39 (5%)	0	709 (100%)
Totals n=4,411 (100%)	422	1,566	841	873	709

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[1] The original NTIES universe of SDUs included a program type called *Specialized Services*. Because clients for the outcome analysis sample were not drawn from these SDUs (n=94), they are excluded from the Exhibit.

APPENDIX B:
DISTRIBUTIONS OF SDU MEANS FOR TREATMENT COMPONENTS WITHIN MODALITIES

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EXHIBIT B-1
LENGTH OF STAY:
DISTRIBUTION OF SDU MEANS BY MODALITY

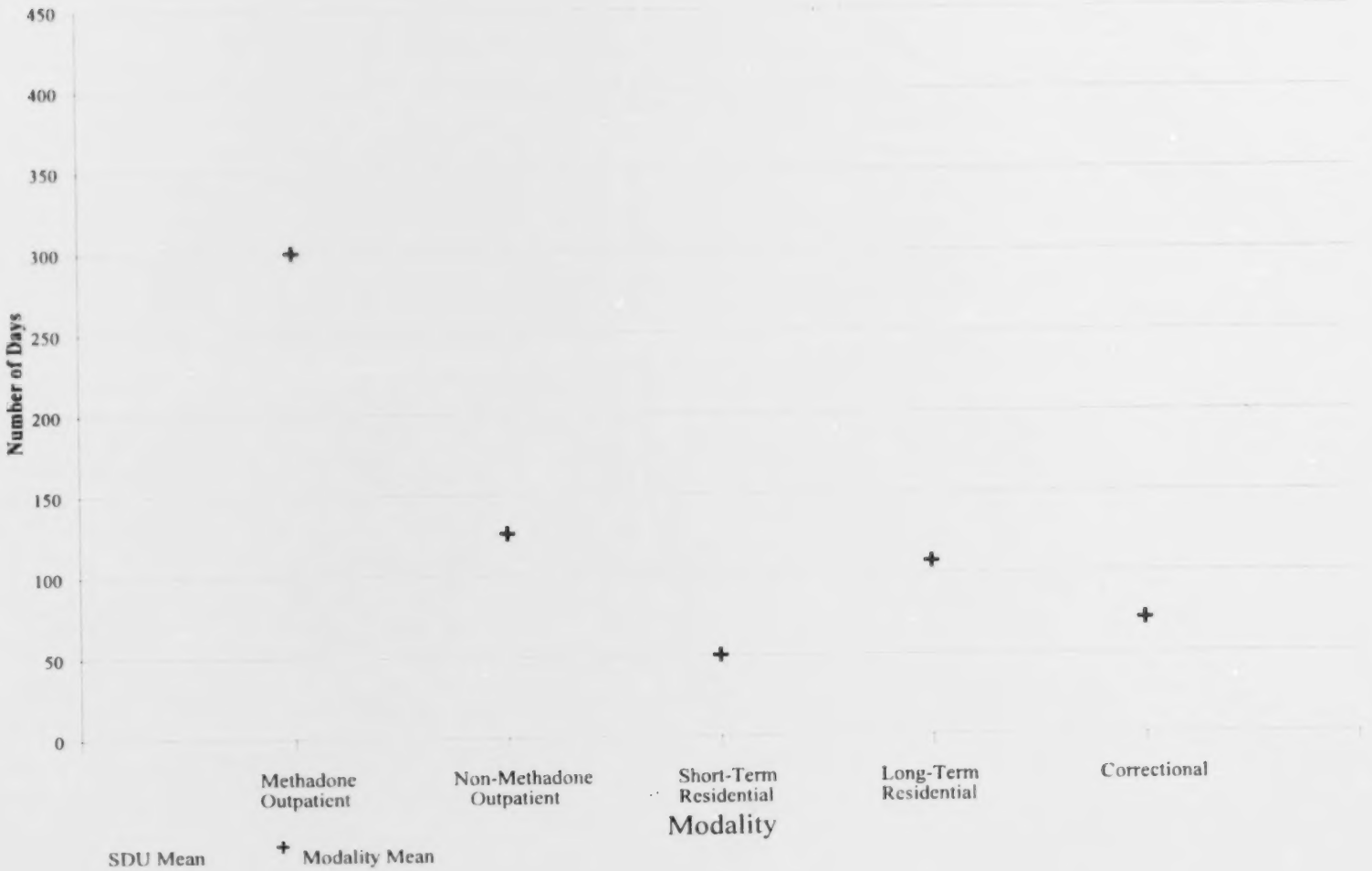

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EXHIBIT B-2
HOURS/MONTHS WITH PRINCIPAL PROVIDER: DISTRIBUTION OF SDU MEANS BY MODALITY

EXHIBIT B-3
PERCENT CLIENTS ATTENDING AA, NA, OR CA MEETINGS: DISTRIBUTION OF SDU MEANS BY MODALITY

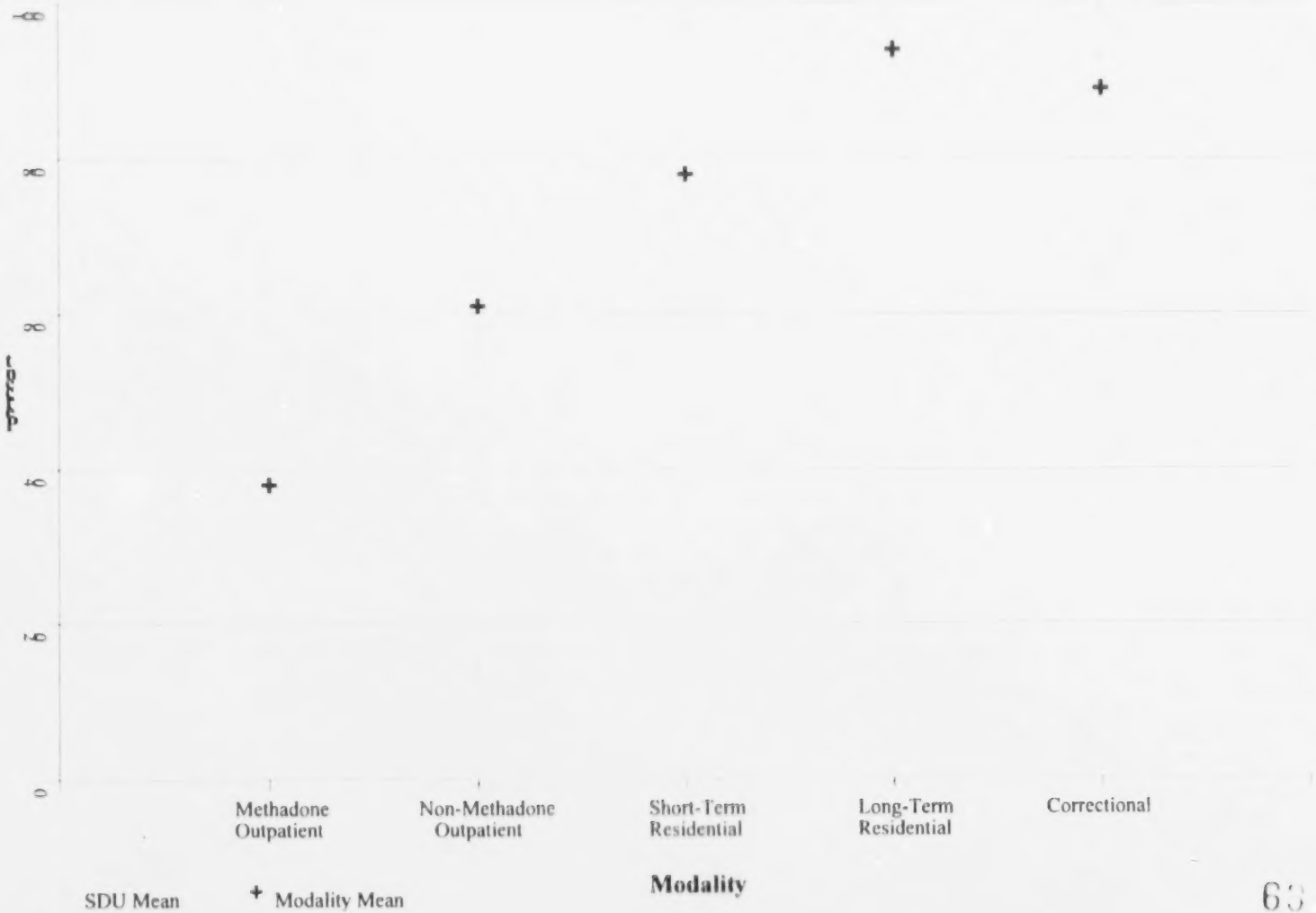


EXHIBIT B-4
PERCENT CLIENTS RECEIVING MEDICATIONS TO TREATMENT SUBSTANCE ABUSE PROBLEM: DISTRIBUTION OF SDU MEANS BY MODALITY

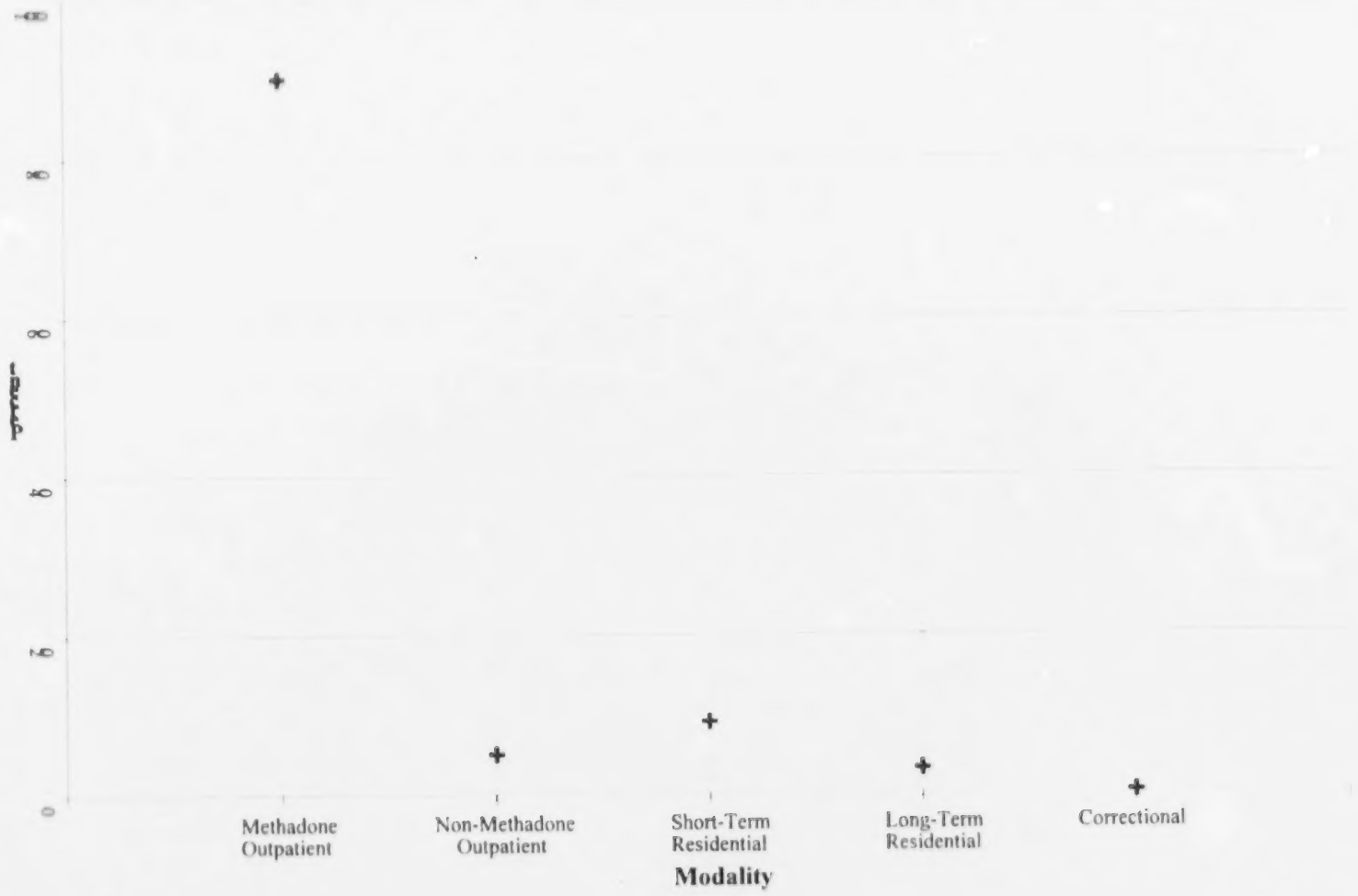


EXHIBIT B-5
PERCENT CLIENTS NEEDING MEDICAL TREATMENT WHO RECEIVED IT: DISTRIBUTION OF SDU MEANS BY MODALITY

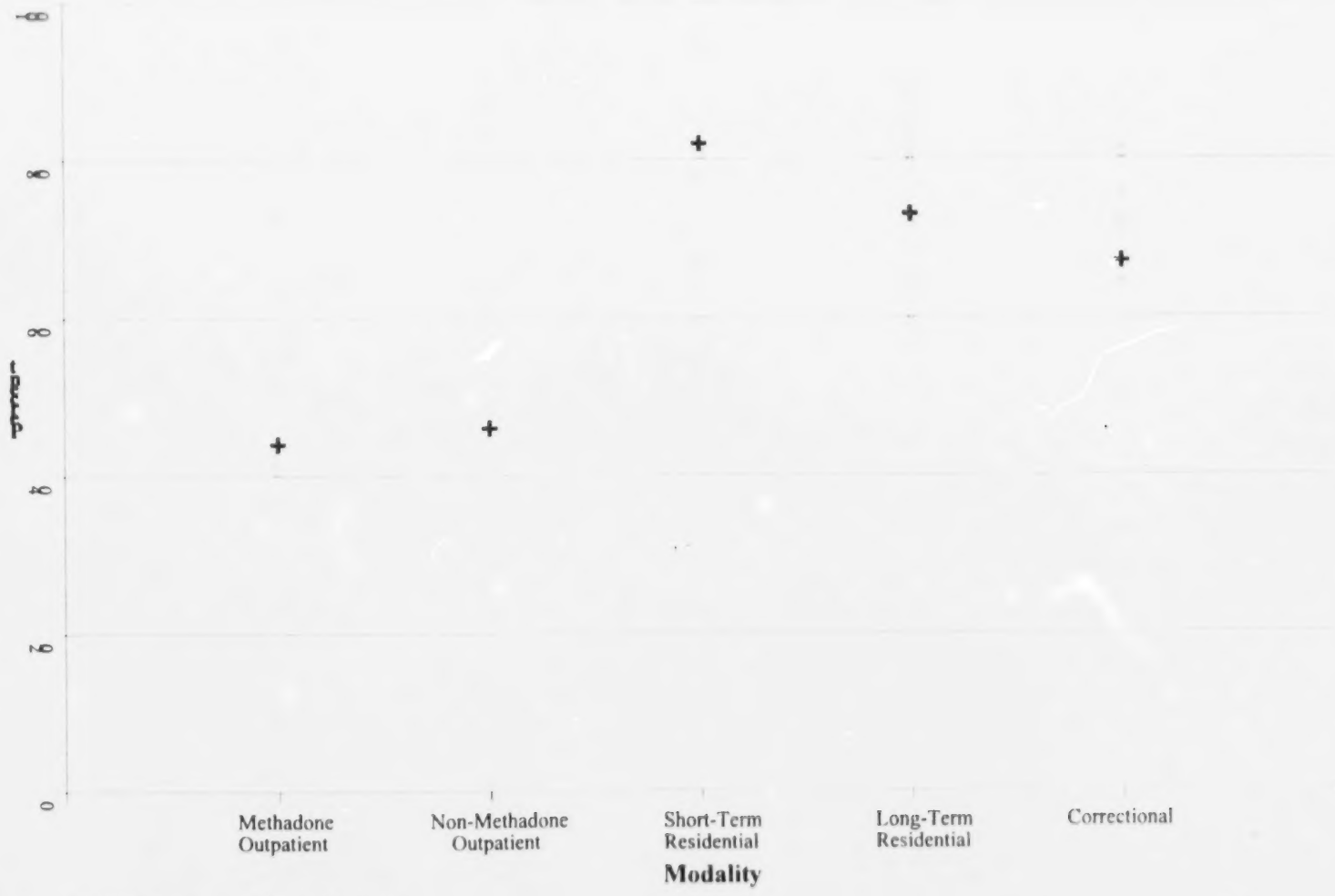


EXHIBIT B-6
PERCENT CLIENTS NEEDING MENTAL HEALTH TREATMENT WHO RECEIVED IT: DISTRIBUTION OF SDU MEANS BY MODALITY

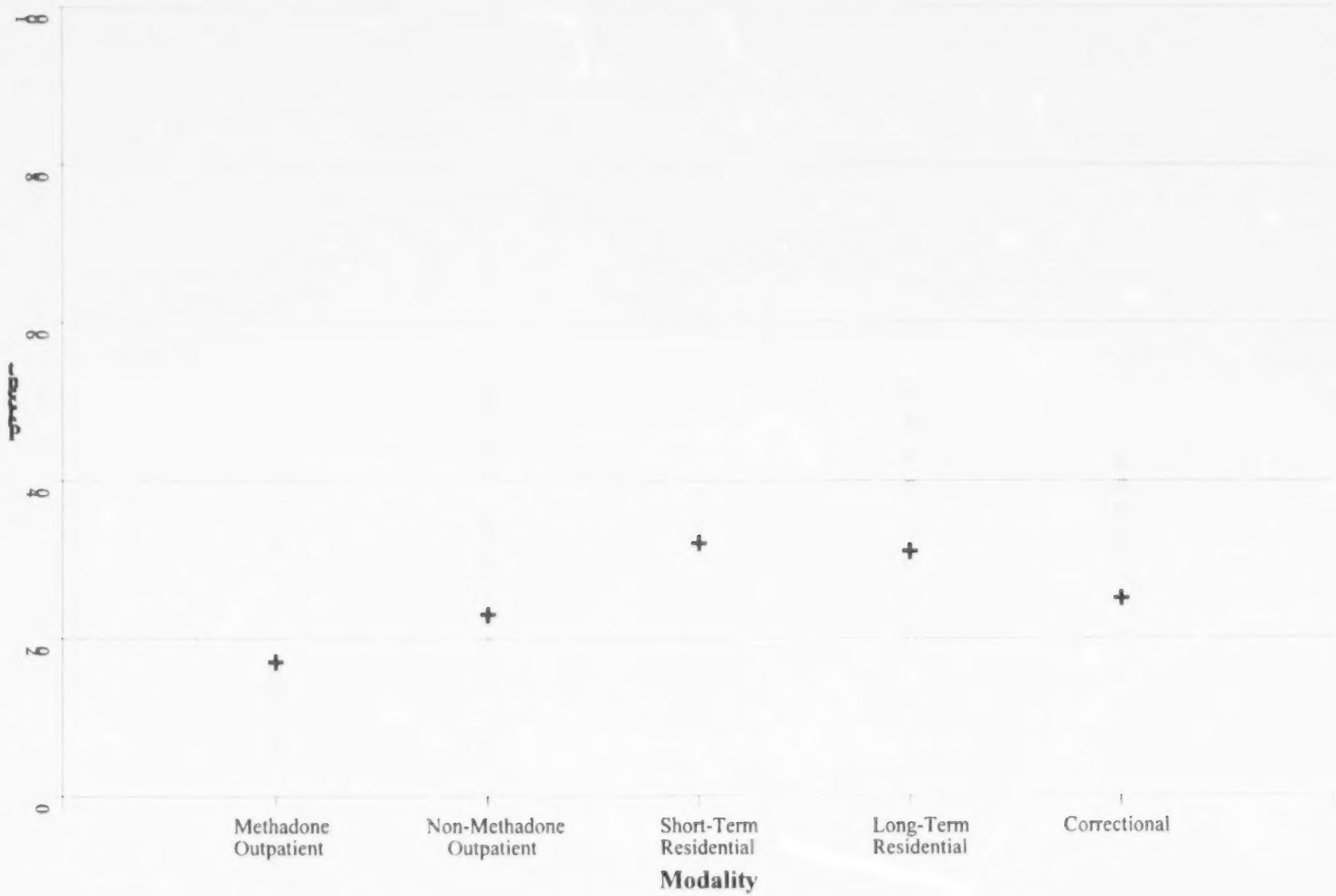


EXHIBIT B-7
PERCENT CLIENTS RECEIVING DIAGNOSTIC HIV OR TB TESTING: DISTRIBUTION OF SDU MEANS BY MODALITY

EXHIBIT B-8
FAMILY COUNSELING, INTERPERSONAL, PARENTING, AND CHILD CARE SERVICES INDEX: DISTRIBUTION OF SDU MEANS BY MODALITY

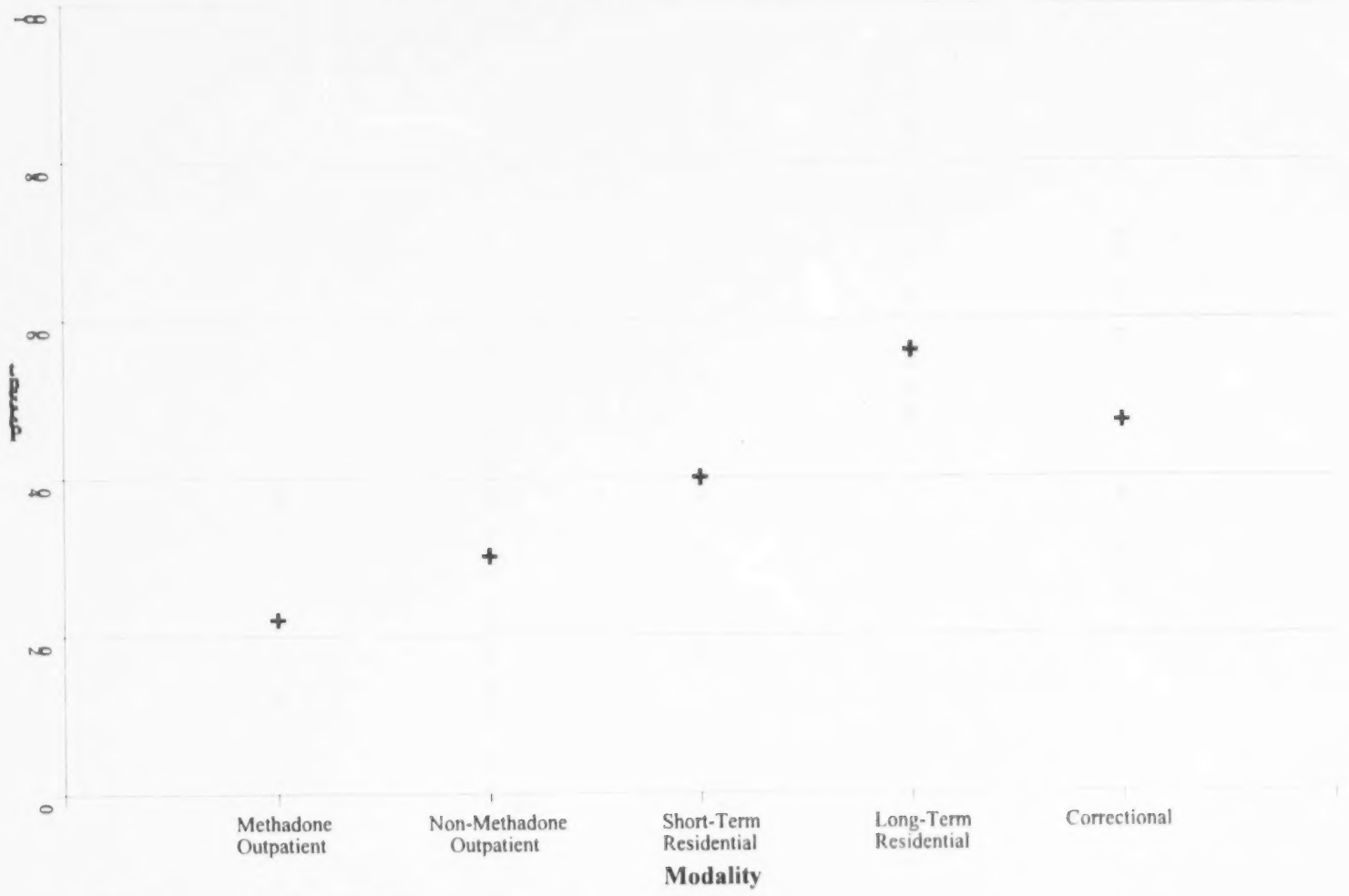


EXHIBIT B-9
HIGH SCHOOL, VOCATIONAL, LEGAL, FINANCIAL, HOUSING & TRANSPORTATION
DISTRIBUTION OF SDU MEANS BY MODALITY

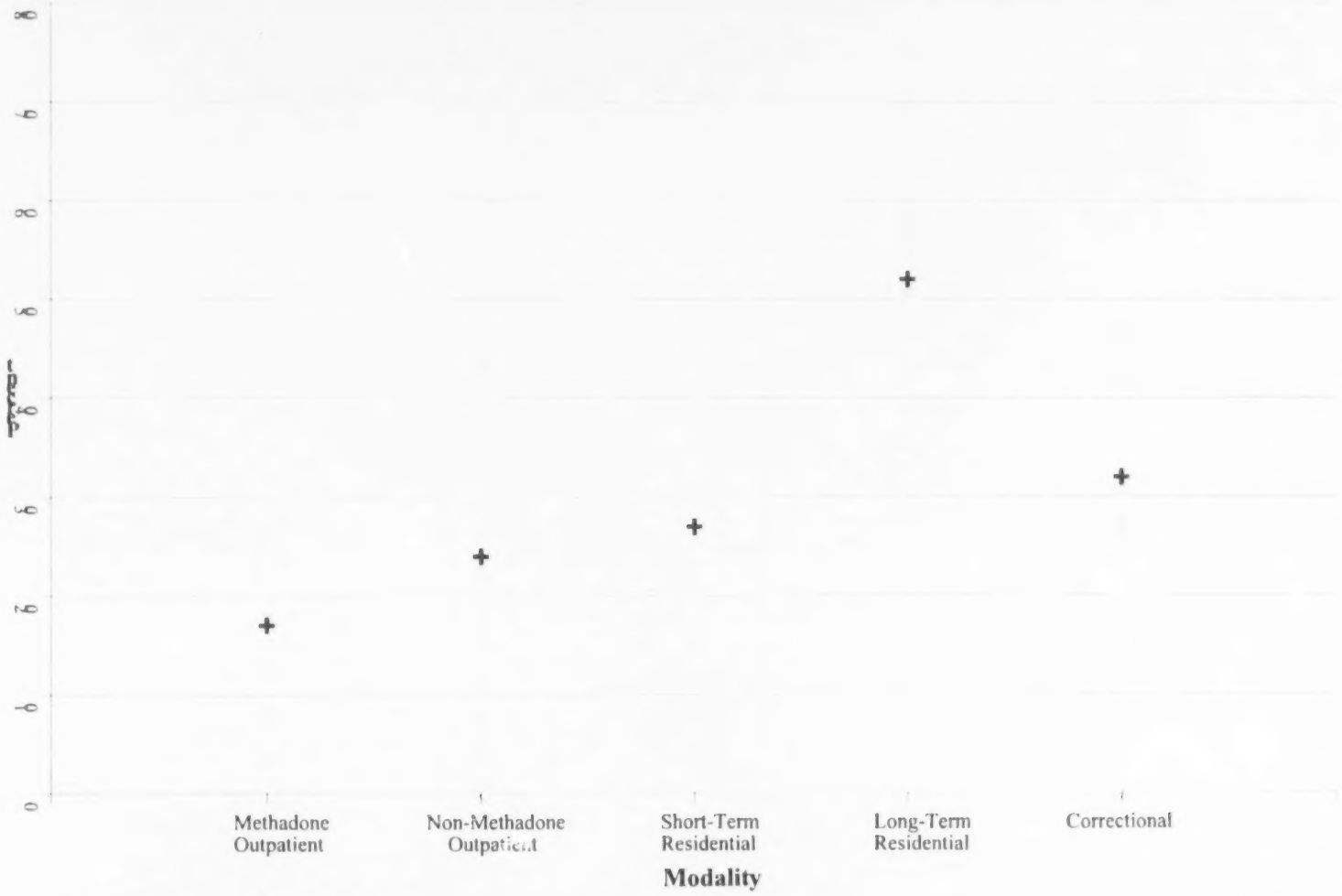
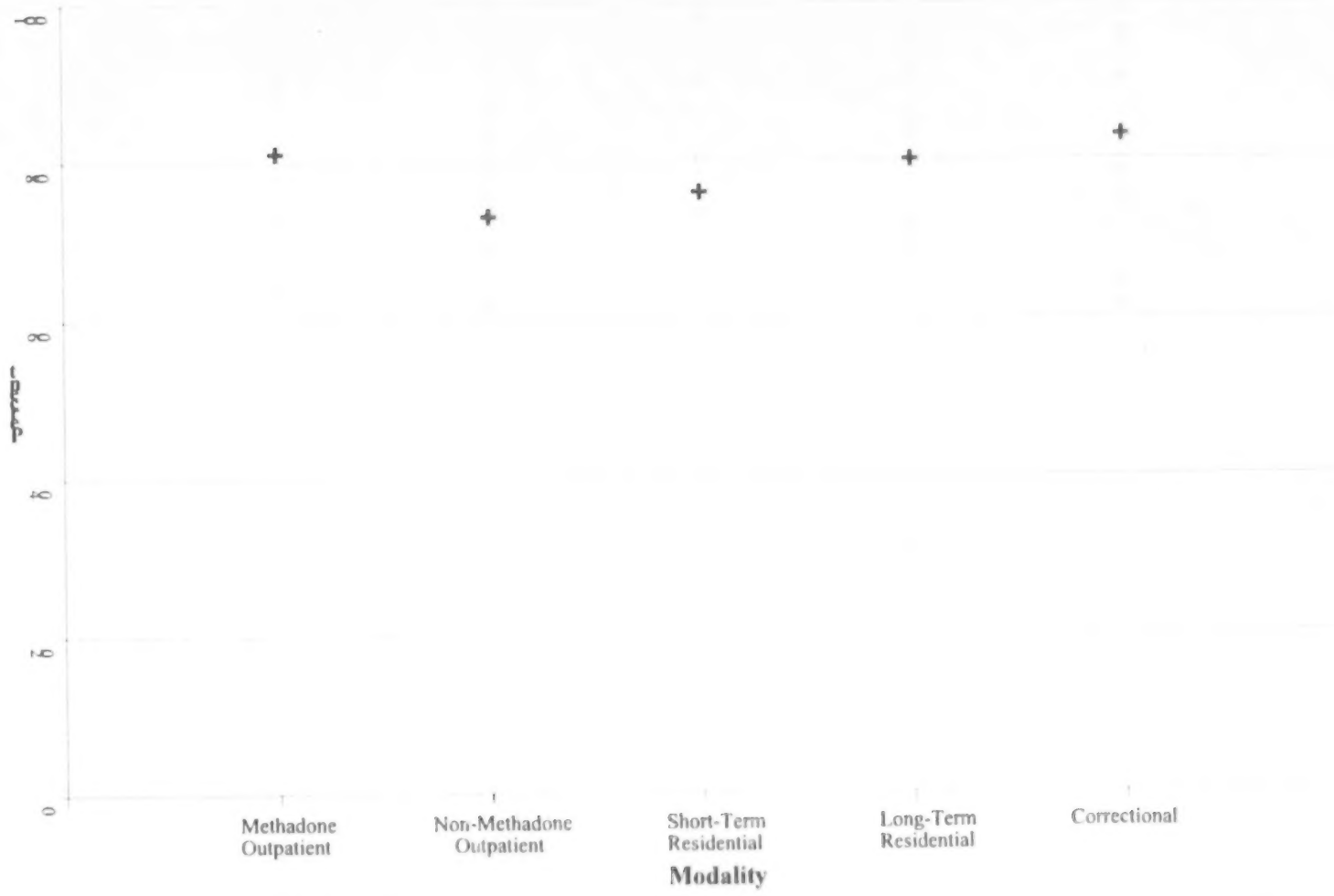


EXHIBIT B-10
PERCENT CLIENTS REPORTING SEEING INDIVIDUAL TREATMENT PLANS: DISTRIBUTION OF SDU MEANS BY MODALITY



APPENDIX C:
TECHNICAL NOTES

APPENDIX C

TECHNICAL NOTES

This appendix contains further detail on determining the analyzable sample and operationalizing treatment components. It is primarily intended for readers wishing to replicate these analyses or conduct further analyses on the NTIES data using the same variables.

1. SAMPLE SIZE

As noted previously, a total of 3,085 clients were used in the analysis, after excluding 451 clients from SDUs with no baseline administrative (NBAR) information, 730 clients without an exit questionnaire (NTEQ), and 145 clients with unknown information for any of the variables included in final models. Generally, variables with 30 percent missing data were excluded from analysis, but this is not always possible when several variables describing relatively rare events and presenting ambiguous missing codes are combined for analysis. This analysis was constructed using roughly 550 variables drawn from the total of 2,900 variables in the NBAR, NRIQ (intake questionnaire), NPRF (patient record abstract form), NTEQ and NPAQ (follow-up questionnaire). However, many of those variables comprise checklists that must be used as a block, leaving about 300 separate data elements of interest in the analysis. There were only one or two items with more than 30 percent missing for the NRIQ, NPRF, and the NPAQ, which contained data from interviews with the client. For the NPRF, which was usually filled out b SDU personnel, about 5 percent of variables had to be dropped. For example, the primar diagnosis at NTIES admission was unknown or missing for 60 percent of all clients. Moreover, additional missing data are embedded within blocks of variables that are presented together. For example, item FI 5 presents "services received" as a list of 24 sub-items. It asks the number of times each was provided, but does not provide an explicit "no" or zero response and has "DON'T KNOW/NO RECORD" for large portions of cases. Because the services are presented in a block, non-responses may be interpreted as "no" (instead of unknown) if there is a response to at least one of the 24 services. However, this interpretation leads to the conclusion that 78 percent of clients received no psychiatrist or psychologist visits (0), 77 percent received no employment counseling (#9), and 62 percent received no interpersonal skills training (#14). These data were found to be at odds with those cited in the client-reported treatment exit questionnaire (NTEQ), and therefore were used only when NTEQ data were not available.

2. IDENTIFYING CLIENTS WITH MENTAL HEALTH NEEDS

Identifying dually diagnosed clients proved difficult. NTIES instruments record first and second DSM III diagnoses, but usually contained a second drug preference rather than a discrete co-morbidity. NRIQ questions about mental health symptoms focused on anxiety, depression, suicide or suicide ideation, hallucinations, and attention-deficit disorder (ADHD) and asked whether these symptoms occurred within the last 12 months and whether they were caused b drugs or alcohol. These general categories of mental illness were considered present if the condition or symptom was reported for the previous 12 month period and if the respective question about drug and/or alcohol involvement was answered "none"(hallucinations and ADHD were not restricted to the previous 12 months). A variable describing mental illnesses at index that were not reportedly caused by drugs or alcohol was defined to be "yes" if any of these general categories were present. This variable identified 813 clients from among the 4,411 with follow-up, ranging from 10 percent for methadone SDUs, 22 percent for non-methadone maintenance SDUs, and 15-19 percent for the remaining SDUs. Clients identified as having mental health disorders using this measure exhibited an average value of 34.6 on the mental health severity scale (RPSYSEV) compared to 17.4 for clients identified as having no mental health disorders.

3. IDENTIFYING CLIENTS UNDER LEGAL PRESSURE TO SEEK TREATMENT

In addition to the 709 clients in correctional facilities modalities, 1,007 clients in the other modalities reported being on parole or probation (F8 - NPRF). Nearly half of the clients in the file (1,924) expressly said they were not on parole or probation, and these data were missing for the remaining clients. Several relevant NRIQ items were reviewed that bear on possible legal pressure that might affect a client's motivation and commitment to treatment, but ultimately the client's self reported information was taken from NRIQ Item 373, which asks, "Is your coming to [AOD treatment] required or recommended by an attorney or anyone in the criminal justice system?"

4. QUANTIFYING INDIVIDUAL AND GROUP COUNSELING (hours per month)

Total time spent in counseling sessions is addressed in Section G of the Baseline Administrative Report (NBAR), Item 15 of the Patient Record Abstract (NPRF), and in sections of the Treatment Exit Questionnaire (NTEQ). The selection of variables to most accuratel

describe a client's total exposure to counseling was not straightforward, however, due to missing and incomplete values in these data.

Item Go of the NBAR asks for the number and duration of group counseling sessions. It was discovered that the SDUs for 1,764 clients provided detail for individual counseling but did not respond to the questions about group therapy. There are even fewer data for time in the classroom, with only 775 clients from SDUs that provided the information.

Combining group and individual counseling was explored as an optional measure b assuming the disparity in response to these items resulted from confusion in their definitions or an inability to distinguish the two. However, this composite did not compare well with measures of total counseling time on other instruments.

The NPRF matrix of 24 services in Item 15, "Services Received," includes individual, group and family counseling among the listed services. These data were reviewed despite the large numbers of apparent non-responses to services like employment counseling and visits with psychiatrists. Of the 3,681 clients with follow-up and an NPRF form, 13 percent reported no group counseling and 8% reported no individual counseling. It seems doubtful that these 13 percent and 8 percent actually mean that the SDU's do not provide group or individual counseling, especially considering that comparable data from clients' NTEQs indicate the received counseling. Furthermore, these items report the total number of times the services were received during treatment, rather than the number of hours per week clients took part in the activity.

Item 176 of the NTEQ asks the client which "staff member [was] the most important to you" from those staff members the patient usually saw for counseling o. treatment. Ninety-three percent of clients with follow-up indicated there was such a person and provided the number and duration of sessions with the provider, while 7 percent said that they could not single out one individual. This information was used in NORC's analysis of client satisfaction.

A measure of the time spent in group and individual counseling, calculated in hours per week, was constructed from all three data sources. Information about the primary provider from the NTEQ was considered first because it was more complete and allowed comparison with the client satisfaction analysis. However, use of this data required eliminating distinctions between group and individual counseling. Items 183 and 191 ask about the frequency (5+/wk, 2-4/wk,

1/wk, 2-4/mo, 1/mo) and duration (<10min, 10-29min, 30-59min, 1-2hrs, more than 2hrs) of counseling or other treatment received from the clients' principal providers. A quantitative variable calculated as the product of interval midpoints was calculated, deriving a mean of 12.6 patient hours per month (median=9 pt hrs/mo), based on 3,402 of the total 4,411 clients with follow-up (730 clients have no NTEQ forms and 279 could not provide a principal provider). When this NTEQ data was unavailable, information was taken next from the NPRF matrix of services. Allowable responses include 1 time, 2-3 times, 4- 10 times, 11 or more times, "number uncertain" and "not mentioned in record." These data were quantified by using the mid-point of the interval. The mean of the non-zero responses for that modality was computed and used for those clients who reported "number uncertain." Values were converted into hours per month b using clients' LOS and assuming sessions to be one hour in duration. Roughly 100 clients with neither a primary provider nor NTEQ data were assigned session hours per month based on the combined group and individual counseling reported in the NBAR. This measure was calculated as the product of the number of sessions and their duration as was done for the NTEQ data.

5. IDENTIFYING CLIENTS FROM SDUs THAT EMPLOY MATCHING

As noted previously, the NTIES data includes no information how patients came to be assigned to their respective modalities nor how they came to be enrolled in their specific SDU within the modality. Matching in this data set only addresses the SDU's practices matching patients to treatment and counselors within their program. Within the NTIES data set, client treatment matching is addressed only in two items in Section F, Treatment Planning, of the Administrative Baseline Report (NIBAR).

All of the SDUs that reported they matched patients also answered question F I Ob (B253M1-B253M8), which asks whether race, ethnicity, language, gender, age, drug use history, mental health needs or other criteria were used to match clients (categories are not exclusive). Among the 2,843 clients from SDUs reporting some kind of matching practice, 43 percent are from SDUs that match on the basis of race, 40 percent on the basis of ethnicity, 55 percent on the basis of language, 66 percent on the basis of gender, 22 percent on the basis of age, 41 percent on the basis of drug-use history, 46 percent on the basis of mental health, and 27 percent on the basis of other criteria. Battelle reviewed combinations of these eight ways of matching patients to treatment, and found that a third of clients were from SDUs that matched on five or more criteria. Matching as practiced by these SDUs may be a more developed and formal practice than that by SDUs that match on 1 or 2 obvious features. A total of 477 clients are from non-

methadone outpatient and long-term residential modalities that match clients on the basis of gender only, and 105 are from short-term residential modalities that only match on the basis of language. Another 227 are from SDUs that specified "other" criteria exclusively. It is not clear that these circumstances are comparable to the detailed assessment of needs talked about in the literature. Since there was little guidance in TIPS or other materials pointing to one matching criteria over another, for the purpose of the present analysis, clients from SDUs that matched on any of the F I Ob criteria were considered to have been matched if the SDU reported it matched most or all of its patients.

6. CALCULATION OF AVERAGE WEEKLY METHADONE

Average weekly methadone dosage was used as a treatment component for the methadone modality only. Methadone dosage is recorded in Item 17 of the NPRF with date and daily dose in milligrams. As noted previously, the manner in which the information was filled out depended upon the length of time the client was in treatment, so that a client's dose might be recorded every day, week or month. For each client, these dose histories were converted into a 2-year or 105 week array to provide a standard context regardless of how it was reported. It was then assumed that dosage within these "benchmarks" could be estimated from the known dosages. This was done by extending the reported dose for a week to the subsequent weeks, until the next reported dose was encountered.